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R. A. BROOMAN & E. J. REED.

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"Lords and Commons of England! consider what nation it is whereof ye are, and whereof ye are the governors: a nation not slow and dull, but of a quick, ingenious, and piercing spirit; acute to invent, subtle and sinewy to discourse, not beneath the reach of any point the highest that human capacity can soar to."—MILTON.

"If we weave a yard of tape in all humility and as well as we can, long hereafter we shall see it was no cotton tape at all, but some galaxy which we braided, and that the threads were Time and Nature."—EMERSON.

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TO THE SIXTY-SEVENTH VOLUME.

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HEATHER'S PATENT FERRY BOAT.

Fig. 2.

Fig. 1.

HEATHER'S PATENT FERRY BOAT.

A very excellent ferry boat, capable of traversing narrow seas, and rough as well as smooth waters, has been patented by Alfred Heather, Esq., Portsmouth. The improved boat is so constructed that horses, vehicles, heavy goods, &c., are placed in the bottom of the boat, and protected by a deck or covering which, together with side platforms, are suitable for passengers.

The engravings on the preceding page represent the improved ferry boat constructed according to Mr. Heather's invention. Fig. 1 is a plan view; fig. 2, a vertical longitudinal section; and fig. 3, a transverse vertical section of the same. A A, are hinged stages or gangways, which are lowered down into the position indicated by dotted lines in fig. 2, for allowing passengers, horses, vehicles, &c., to pass over on entering or leaving the boat, and which are subsequently raised by any suitable apparatus before the boat is put in motion. B B, are side passages into which horses, vehicles, &c., are received, and where they remain during the passage of the boat, passing out over the stage, A, at the end of the boat opposite to that at which they entered, when the passage is completed. C C, are steps, up which foot passengers ascend to the side decks, D, D, on which they can remain during the passage, or from which they can ascend to the central upper deck, E, which forms the covering for the horses and vehicles. F is a closed compartment or room, dividing the passages, B, B, from each other, and which may be used as an engine-room for containing engines by which the paddle wheels (or other propelling apparatus, if paddle wheels be not used) may be driven. The engines may, however, be placed in any other suitable position. G G are the rudders of the boat, which are fitted with racks, H, H, by means of which, and pinions, I I, one or other of the rudders may be drawn up within the cases, I′ I′, in the bottom of the boat, as may be required, the one which is left in the water being that which is near that end of the vessel which, for the time being, is astern. J J are the steering wheels, which are put into connection with the rudders, by the pinions and circular racks, *a a*, and *b b*. The landing stages or gangways, A A, are formed to correspond upon their under sides with the shape of the bottom of the boat, and are so fitted, that when drawn up into their usual positions, they make water-tight joints.

PROFESSOR FARADAY ON THE RELATIONS OF GOLD TO LIGHT.

About a twelvemonth since Professor Faraday gave to the members of the Royal Institution an account of some experiments he had made on the relation of gold to light, and on the 12th of last month renewed the subject, and added other interesting details. On the first occasion, he said he had been led by certain considerations to seek experimentally for some effect on the rays of light by bodies which, when in small quantities, had strong peculiar action upon it, and which also could be divided into plates and particles so thin and minute as to come far within the dimensions of an undulation of light, whilst they still retained more or less of the power they had in mass. The vibrations of light are, for the violet ray 59,570 in an inch, and for the red ray 37,640 in an inch; it is the lateral portion of the vibration of the ether * which is by hypothesis supposed to affect the eye, but the relation of number remains the same. Now a leaf of gold supplied by the mechanician is only $\frac{1}{282000}$ of an inch in thickness, so that 7½ of these leaves might be placed in the space occupied by a single undulation of the red ray, and five is the space occupied by a violet undulation. Gold of this thickness and in this state is transparent, transmitting green light, whilst yellow light is reflected; there is every reason to believe also that some is absorbed, as happens with all ordinary bodies. When gold leaf is laid upon a layer of water on glass, the water may easily be removed, and solutions be substituted for it; in this way, a solution of chlorine, or of cyanide of potassium, may be employed to thin the film of gold; and as the latter dissolves the other metals present in the gold (silver, for instance, which chlorine leaves as a chloride), it gives a pure result; and by washing away the cyanide, and draining and drying the last remains of water, the film is left attached to the glass: it may be experimented with, though in a state of extreme tenuity. Examined either by the electric lamp, or the solar spectrum, or the microscope, this film was apparently continuous in many parts where its thickness could not be a tenth or twentieth part of the original gold leaf. In these parts gold appeared as a very transparent thing, reflecting yellow light and transmitting green and other rays; it was so thin that it probably did not oc-

* Analogous transverse vibration may easily be obtained on the surface of water or other fluids, by the process described in the *Philosophical Transactions* for 1831, p. 336, &c.

cupy more than a hundredth part of a vibration of light, and yet there was no peculiar effect produced. The rays of the spectrum were in succession sent through it; a part of all of them was either stopped or turned back, but that which passed through was unchanged in its character, whether the gold plate was under ordinary circumstances, or in a very intense magnetic field of force.

When gold leaf is heated on glass, the heat causes its retraction and running together. To common observation, the gold leaf disappears, and but little light is then reflected or stopped; but if pressure by a polished agate convex surface be applied to the gold in such places, reflective power reappears to a greater or smaller degree, and green light is again transmitted.

Since the first experiments of Professor Faraday pure gold leaf has been obtained by him through the kindness of Mr. Smirke, and the former observations verified. This was the more important in regard to the effect of heat in taking away the green colour of the transmitted light, and destroying to a large extent the power of reflexion. The temperature of boiling oil, if continued long enough, is sufficient for this effect; but a higher temperature (far short of fusion) produces it more rapidly. Whether it is the result of a mere breaking up by retraction of a corrugated film, or an allotropic change, is uncertain. Pressure restores the green colour; but it also has the like effect upon films obtained by other processes than beating. Corresponding results are produced with other metals.

Films of gold may be obtained on a weak solution of the metal, by bringing an atmosphere containing vapours of phosphorus into contact with it. They are produced also when small particles of phosphorus are placed floating on such a solution; and then, as a film differing in thickness is formed, the concentric rings due to Newton's thin plates are produced. These films transmit light of various colours. When heated they become amethystine or ruby; and then, when pressed, become green, just as heated gold leaf. This effect of pressure is characteristic of metallic gold, whether it is in leaf, or film, or dust.

Gold wire, separated into very fine particles by the electric deflagration, produces a deposit on glass, which, being examined, either chemically or physically, proves to be pure metallic gold. This deposit transmits various coloured rays; some parts are grey, others green or amethystine, or even a bright ruby. In order to remove any possibility of a compound of gold, as an oxide, being present, the deflagrations were made upon topaz, mica, and rock crystal, as well as glass, and also in atmospheres of carbonic acid and of hydrogen. Still the results were the same, and ruby gold appeared in one case as much as in another. Being heated, all parts of the deposit became of an amethystine or ruby colour; and by pressure these parts could be changed so as to transmit the green ray.

Fluids, consisting of very finely divided particles of gold diffused through water, may be of various colours by transmitting light from ruby to blue; the effects being produced only by diffused particles of metallic gold. The differently coloured fluids may have the coloured particles partially removed by filtration; and, so long as the particles are kept by the filter from aggregation, they preserve their ruby or other colour unchanged, even though salt be present. If fine isinglass be soaked in water, then warmed to melt it, and one of these rich fluids be added, with agitation, a ruby jelly fluid will be obtained, which, when sufficiently concentrated and cold, supplies a tremulous jelly; and this, when dried, yields a hard ruby gelatine, which being soaked in water becomes tremulous again, and by heat and more water yields a ruby fluid. The dry hard ruby jelly is perfectly analogous to the well-known ruby glass, though often finer in colour; and both owe the colour to particles of metallic gold. Animal membranes may in like manner have ruby particles diffused through them, and then are perfectly analogous in their action on light to the gold ruby glass, and from the same cause.

When a leaf of beaten gold is held obliquely across a ray of common light, it polarises a portion of it; and the light transmitted is polarised in the same direction as that transmitted by a bundle of thin plates of glass; the effect is produced by the heated leaf as well as by the green leaf, and does not appear to be due to any condition brought on by the heating or to internal structure. When a polarised ray is employed, and the inclined leaf held across it, the ray is affected, and a part passes the analyser, provided the gold film is inclined in a plane forming an angle of 45° with the plane of polarisation. Like effects are produced by the films of gold produced from solution and phosphorus, and also by the deposited dust of gold due to the electric discharge. The same effects are produced by the other deflagrated metals so long as the dusty films are in the metallic state. As these finer preparations could be held in place only on glass or some such substance, and as glass itself had an effect, it was necessary to find a medium in which the power of the glass was nothing; and this was obtained in the

bisulphide of carbon. Here the effect of gold upon a ray of light which was unaffected by the glass supporting it, was rendered very manifest, not only to a single observer, but also to a large audience.

The object of these investigations was to ascertain the varied powers of a substance acting upon light, when its particles were extremely divided, to the exclusion of every other change of constitution. It was hoped that some of the very important differences in the action upon the rays might in this way be referred to the relation in size or in number of the vibrations of the light and the particles of the body, and also to the distance of the latter from each other; and, as many of the effects are novel in this point of view, it is hoped by Dr. Faraday that they will be of service to the physical philosopher.

IMPROVED WATER-HEATING APPARATUS.

The Birmingham Patent Tube Company has introduced the improved method of heating by water, which is represented in the accompanying engraving, and which will be found very simple in its character, effective in its operation, and economical in its working and cost. The heat is generated in a coil placed at the back of a kitchen, sitting-room, or any other grate; the water in such coil, becoming warm, begins to ascend and traverse the piping, as shown by the arrows, thereby transmitting the heat obtained in the coil to the piping through which it passes, until, having parted with its heat, it descends to the lowest level, and passing again through the coil is re-heated, and keeps up a constant circulation through any length of piping found to be required, producing a temperature of 200 degrees, or less, if desirable, in the radiating coil B with an ordinary fire in the grate containing the coil A.

It has generally been found, in circulating hot water through a series of pipes, closed at both ends, that much inconvenience and annoyance has been occasioned by the offensive cracking report caused by the introduction of air, or the liberation of gases by an excess of heat. This is avoided in the improved apparatus.

The small cistern, C, holding only sufficient water to accommodate the expansion and contraction of that in the range of piping, is placed (not less than four feet) above the highest level of the range, thus acting as a regulating valve, in keeping up a pressure sufficient for the circulating power of the apparatus. The small pipe, D, is also a safety valve from the lowest level, by which any impediment finds ready relief, being carried off into cistern C, thus making a perfect equilibrium of pressure through the whole range of piping.

The peculiarity of the grate will be seen

in its having a double back, as shown at E and F, which accommodates the required heat supplied to the coil A. If an increase is required, the register G is shut, and the heat passes through the coil A, as shown by the arrows, and up the chimney through the opening figure, H. If a decrease is desirable, the register is thrown back, and covers the opening, H, and the heat ascends the chimney in the regular way.

It is necessary that clean rain water should only be used in the apparatus, to prevent incrustation taking place in the pipes.

One ordinary fire is sufficient to heat three or four coils, in separate apartments; and the principle is applicable for any description of buildings, where regular heat is required, without the danger and expense of an extra fire.

GREAT TRIAL OF REAPING MACHINES IN HUNGARY.

In our number for April 25th we stated that Baron Ward had given notice to the Imperial Agricultural Society of Vienna that he challenged all English and American reaping-machines to compete with his. The challenge having been accepted, the trial took place a fortnight since, in a field of rye about four miles from Pesth, in Hungary. The following account of it is condensed from the letter of the correspondent of *Bell's Weekly Messenger*. So great was the interest excited, that the Archduke Albert and several of the leading functionaries of state attended to watch the proceedings, and report the result.

There were only three reapers on the ground; one by Baron Ward, a second by M. Szabo, of Pesth, and the third, Burgess and Key's improved M'Cormick. Sometimes the reapers were drawn by oxen, and sometimes by horses, in order to test their working powers under different circumstances. M. Szabo's machine very quickly got choked, and had to retire from the field. Baron Ward's machine did its work very fairly; but, independently of being heavy in draught, and frequently leaping right over the corn, and leaving large patches, not cut, but trampled down, it requires two men to rake off what it cuts, and such is the severity of labour, that no two men of ordinary strength could last a couple of hours at such work. The Archduke pithily remarked that it would not be a bad machine if the baron could only manage to do without his two men. There were four horses required to draw it round the first cut, although the crop was by no means heavy, and four oxen the second and third; but, after every effort to make it succeed, in the opinion of all who saw it, it came out middlingly from the trial. The interest, therefore, was naturally concentrated upon Burgess and Key's M'Cormick, and, as it had not worked at the Vienna show, great anxiety was felt as to the results of its operations. It is also just to remark that great regret was expressed by several gentlemen, who had a deep interest in the question, that Dray and Co.'s reaper was not in the field, as it worked so much to the satisfaction of those who saw it at Florisdorf. It appears, however, that it only arrived one day after the fair, by mistake or unavoidable delay.

Burgess and Key's reaper not only came up to what was expected of it, but went far beyond. After making one round with a couple of horses only (the horses are light in Hungary), the approval of its working capacity was so marked, that there was not even the shadow of a doubt in any one mind on the field as to its marked superiority over the others, and of its apparently answering the various requirements of such a machine in Hungary. This reaper did its work clean, easy, and in comparatively quick time, besides requiring much less draught, not so many men to attend it, and doing no injury to the corn. The Archduke, after seeing the reaper tried first by horses, and then by oxen, and quietly following it along the field, congratulated the representatives of Burgess and Key, and emphatically remarked, that it was immeasurably the best machine there, and that it fully answered all the requirements that he could conceive of such a machine. After this declaration, the whole company took off their hats, and gave a hearty cheer for being honoured by English machinery in assisting them in their field work. The success, as far as Hungary is concerned, is certainly very decided in character for this reaper.

The Metropolitan Postal Districts.—Mr. Stanford, stationer, of Charing-cross, proposes to manufacture envelopes each with a designation (by preference on their inner face) of some one of the several London local districts mapped out by the Post-office authorities, and to provide the public by that means with a ready reference showing the district from which any local letter that has to be answered was sent. The Post-office authorities have also published a cheap atlas comprising a map of each of the new districts, a general map of the whole, and a list of streets, &c., arranged to facilitate reference to them.

BENTLEY'S INDUCTION COIL.

THE following is the description of Mr. Bentley's coil (written by himself), which we promised in our last to publish:

"My induction apparatus differs from Ruhmkorff's in three important parts of its structure: first, in the method of insulation; secondly, in the contact breaker; and thirdly, in the formation of the condenser. Ruhmkorff, as your readers are aware, insulated his secondary wire with shell-lac; but as this substance, though an excellent insulator, is liable to crack, I have adopted gutta-percha tissue for the insulation of my wire; and I apply it in the form of ribbon an inch wide, which I obtain by cutting slices from a firm roll of that substance; four or five layers are necessary between each layer of wire, as the current from a single layer is sufficiently intense to strike through one-tenth of an inch of air.

"The contact breaker is a more important part of the apparatus, for without the one I have contrived I do not obtain nearly so great a quantity of static electricity. It consists of a strong steel spring, fastened firmly at one end, and having the platinum contact piece in the centre, behind which is a piece of iron to be attracted by the iron core; at the other end of the spring is a screw, by which I can force the two contact pieces together with a force of one ounce to ten pounds; the steel spring therefore vibrates from its centre, and it is only when the whole of the battery current has traversed the primary wire that the iron core has sufficient power to draw the two contact pieces asunder. It may be interesting to state, that the condenser has not the slightest effect on the *quantity* of electric force developed in the secondary wire, but increases the intensity to an enormous extent; and as it is better to have it as large as possible, I have formed mine of 120 sheets of tinfoil, 6 × 12, placed between double that number of varnished sheets of paper, the alternate sheets of foil being brought out and soldered to appropriate binding-screws. The length of secondary wire in the coil described is 2 miles, and its gauge No. 35. The primary helix is formed of 30 yards of No. 14 wire, and is wound on an iron wire core 9 inches long and 1¾ inch diameter, in which is placed as an axis an iron rod to support the coil, which I place in a box constructed for that purpose.

"The instrument gives an induction spark two inches long in air of ordinary density when excited by four or five cells of Grove's battery; and the quantity of static electricity is so great, that it will charge a quart Leyden jar two hundred times per second, the discharge taking place through an interval of one inch and a quarter.

"The thermal phenomena are also very striking; for when the secondary wires are separated about three-quarters of an inch, an arc of flame passes the interval, and fuses electrodes presenting twenty times the sectional area of the wire from which the current is produced: the flame can at the same time be acted upon by a permanent magnet in the same manner as the voltaic arc. This heating power appears to depend, not upon the *quantity* of electricity passing, but upon the resistance it can overcome; consequently the thermal effects disappear *in vacuo*, to be reproduced upon the gradual admission of air or other resisting media."

BEATTIE'S PATENT RAILWAY ENGINES, CARRIAGES, AND WHEELS.

COURT OF QUEEN'S BENCH, GUILDHALL, JUNE 26—7.

(*Sittings at Nisi Prius, before Mr. Justice Erle and a Special Jury.*)

BEATTIE *v.* THE LONDON, BRIGHTON, AND SOUTH COAST RAILWAY COMPANY.

MR. KNOWLES, Mr. Wilde, and Mr. Hindmarch were counsel for the plaintiff; Mr. Bovill, Mr. Webster, and Mr. Aston for the defendants.

The declarations stated that the plaintiff had, in the year 1840, obtained a patent for an improvement in engines, carriages, and wheels in use on railways, which the defendants had infringed. The defendants pleaded that they had not been guilty of the alleged infringement; that there was no sufficient specification; that the plaintiff was not the first inventor of the improvement in question; that it was not a new invention; and, lastly, the Statute of Limitations.

The plaintiff for some time acted in the capacity of chief locomotive engineer to the London and South-Western Railway Company. He had given to the world a very useful invention, which from the date of its discovery had been adopted by almost every railway in the country, and which consisted in the construction of a lathe by which two railway wheels might be bored and turned at the same time and driven from or by the same cone pulley. By means of the ordinary lathe which had previously been in use only one wheel at a time could be bored or turned, and the result of the invention had been not only increased economy, but increased efficiency and certainty in the working of the machinery.

The patent expired in December, 1854, but it was not until nearly two years after that the action was commenced. The case came on for trial in June, 1856, and the

plaintiff obtained a verdict, which was subsequently set aside and a new trial ordered. The plaintiff, in the specification of his patent, claimed as new the combination of apparatus by which he produced the desired result of turning two wheels at the same time. In support of his case Mr. Locke, Mr. Stephenson, Mr. Fothergill, and other engineers were called. They stated that the invention of the plaintiff was a new and important one, which fully effected its purpose, and according to their experience was, at the date of the patent, perfectly new; that it was useful to effect its purpose, and a complete machine; and that the machines used by the defendants in their works were of the same construction.

To support their pleas the defendants attempted to show that at the date of the patent there were machines at work in various places substantially the same as that of the plaintiff's. Three models were produced in court. The first was that of a lathe used at the Milton Works, but the defendants failed to show it was in use in December, 1840, and abandoned so much of their case as depended on it; the second machine had been invented in 1838 by a Mr. Crossley, and used at Royton Works for turning pulleys; the third was a modification of it, which was used at Brymbo Works for boring and turning pipes.

Mr. Justice Erle left it to the jury to say whether the machine of the plaintiff was substantially the same as those relied on by the defendants. The plaintiff admitted all the ingredients of his machine were old, but claimed that the combination of them to produce the desired result was new.

The jury found for the plaintiff.

It was agreed that the damages should be assessed at the amount found in the former trial—124*l*., being a royalty of 10 per cent. on the price of the machines used by the defendants.

Verdict for the plaintiff—damages, 124*l*.

THOMAS'S SEWING MACHINE PATENT.

COURT OF QUEEN'S BENCH, GUILDHALL, JUNE 26—7.

(*Before Lord Campbell and a Special Jury.*)

THOMAS *v.* REYNOLDS.

SIR F. THESIGER, Mr. Webster, and Mr. Salter appeared for the plaintiff; Mr. Atherton, Q.C., Mr. H. Hill, Q.C., and Mr. Hindmarch for the defendant.

The plaintiff, Mr. Thomas, was a manufacturer of Cheapside, and he sued the defendant, G. W. Reynolds, a stay manufacturer, Birmingham, to recover damages for the infringement of a patent which had been granted to the plaintiff on the 1st of Dec., 1846, for "improvements in machinery for sewing or stitching various fabrics." The defendant, among other pleas, pleaded two pleas, denying the novelty of the plaintiff's invention, and also the infringement by the defendant. It appeared from the plaintiff's evidence that his patent was dated the 1st of December, 1846.

This was the invention of an American named Howe, who came over to this country when the patent was granted, Dec. 1, 1846, and remained with the plaintiff for about two years. The plaintiff's process may be described thus:—A needle grooved on both sides, and with an eye near the point, was either fixed to a lever or to a slide attached to a lever. The lever was actuated or set in motion by a "cam surface" on a rotary axis. The thread supplied by a bobbin passed through the eye of the needle, and the needle was made to pass through the fabric to be sewn, the fabric being at the same time pressed between two surfaces, through which there were holes for the needle to pass through. The needle was then drawn back, and left the thread which had passed through in the form of a loop. A shuttle then carried another thread through the loop so formed, and as the needle was drawn out the thread was prevented by the other thread from returning, and so a stitch was formed. Other stitches were formed in the same manner, and to such a perfection has the patented machine been now brought by the plaintiff's son, who has taken out several patents for improvements on the machine now in question, that 1,000 stitches can be made in one minute. The machines were exhibited in court and set to work, so that the jury had an opportunity of seeing the interesting results. No question was made as to the utility of the invention; and, as to the infringement, it appeared that the defendant, a staymaker at Birmingham, had forty machines at work at his establishment, which he had bought of Messrs. Grover, Baker, and Co., machine makers, at New York (the real defendants), and which there was no doubt were made after the plaintiff's specification. In fact, some of them had the plaintiff's name, "Howe's Patent," impressed upon them.

At the close of the plaintiff's case,

Mr. Atherton submitted that there was no case for the jury. According to the evidence already given it was proved that the plaintiff's second claim, the application of the shuttle in combination with a needle for forming and securing loops of thread for the purpose of producing stitches, was identical with the process patented by Fisher and Gibbons in 1844; and, as to the plaintiff's third claim, which referred to the sliding-frame, which held the fabric in such a manner that it could be moved in any required direction, to receive straight and curved lines of stitches, the learned counsel contended that that was identical with Duncan's sliding frame patented so far back as 1804.

Lord Campbell said, he was clearly of opinion that there was evidence to go to the jury, both as to the novelty of the plaintiff's invention, and as to the infringement by the defendant.

The counsel for the defendant then called several witnesses to prove the identity of the plaintiff's process with the two processes referred to.

The only difference which the witnesses acknowledged was that the plaintiff's frame was actuated by a "rack and pulley," and Duncan's by "screws," which were said to be "mechanical equivalents."

Mr. Atherton, Q.C., and Sir F. Thesiger having severally addressed the jury upon the evidence,

Lord Campbell summed up. His Lordship said, he was sorry to say that Mr. Baker did not appear to great advantage in this proceeding. A countryman of his (Mr. Howe), had become the inventor of a most useful machine; and it was to the honour of the American people that they distinguished themselves so much, and in nothing more than by their inventions. That invention, the value of which the jury had had an opportunity of estimating, had been sold to the plaintiff, who had taken out a patent, as he was at liberty to do, according to the law of this country. For ten long years he had remained in undisturbed possession of his patent; but Baker had now sent over to this country machines which clearly claimed to be Howe's invention, and some of which actually had Howe's name put upon them. That being the case, and an action being brought by the plaintiff against the defendant, a staymaker at Birmingham, what does Baker do? He says he has not infringed Howe's patent, although he has put on them the name of Howe as the maker. But when the case was brought into court, the counsel for the defendant felt that it would not be decent to set up such a defence, and to call on the jury to say that there had been no infringement. The only question then raised was as to the validity of the plaintiff's patent. It was said that there was no novelty in it, and, out of the eight points of objection of which notice had been given, two only were relied upon—viz., that the plaintiff's second claim was anticipated by Fisher and Gibbon's patent of 1844, and his third claim by Duncan's patent of 1804. After reading over the evidence on both sides, his Lordship said, it would be for the jury to say whether or not either of those patents was substantially the same as the plaintiff's. If they, or either of them, were so, the defendant would be entitled to a verdict; but if the jury thought there was a substantial difference they ought to find their verdict for the plaintiff.

The jury, without the least hesitation, found a verdict for the plaintiff with 40s. damages.

Lord Campbell said, he would give all the necessary certificates to entitle the plaintiff to costs, &c.

London Mechanics' Institution.—A deputation of gentlemen favourable to a government grant to the London Mechanics' Institution had an interview with Earl Granville on Saturday at the Privy Council office. The deputation consisted of Mr. W. Birkbeck (President), Mr. Valentine Knight (Vice-President), Mr. R. A. Brooman (Editor of the *Mechanics' Magazine*), Mr. S. Valentine (Chairman of the Special Committee of the London Mechanics' Institution), Mr. John Robert Taylor (Hon. Sec. to the Special Committee of the London Mechanics' Institution), Mr. Thomas Allan Reed, Mr. Samuel Davey, Mr. James Gowland (Treasurer), and Mr. Andrew M'Farlane (Secretary).—*Times.*

The Chemical Atlas, or Tables: showing at a glance the operations of qualitative analysis, with practical observations, and copious indices of tests and re-actions; accompanied by a dictionary of simple and compound substances, indicating the tests by which they may be identified, and a dictionary of re-agents, indicating their preparation for the laboratory, the means of testing their purity, and their behaviour with substances. By A. Normandy, Author of the "Commercial Handbook of Chemical Analysis," &c., &c.

In order to make our readers thoroughly acquainted with the design and contents of this work, we cannot do better than add to the above transcript of the title-page the following passage from the preface. The Author says:—"What I now offer to the public, and more particularly to the chemical student, and to the manufacturer, miner, and assayer, is a practical guide to chemical qualitative analysis—an atlas in which the operations of that branch of chemical research are mapped out, as it were, so as to show, I believe clearly and at a glance, not only the various steps of the analysis, but those which lead in the most direct and safe manner to the contemplated end. The ways there pointed out are not all right royal roads; for in the course, so to speak, of a complicated voyage of discovery, there are evidently many shoals to wade through, pitfalls to avoid, and occasionally some danger of collision; but all these will, I trust, be correctly indicated or signalized; and I have no doubt but that, if proper attention be paid to directions given, and to the observations which accompany them, the traveller, if I may be allowed to continue the simile, will find himself safely landed at the desired termination of his journey.

"In the Tables, the names of the substances found or sought for, and those of the re-agents used, both for the sake of brevity and accuracy, are represented by their symbols; and even in the non-tabulated part of the work, where the necessity of condensing words in the smallest possible space exists, the symbols are generally retained; but I have given a list of the symbols used in the work, arranged in alphabetical order, so that the reader may, by referring to it, obtain at once the necessary interpretation without loss of time.

"The Atlas is accompanied with two concise Dictionaries, one of which is a list of the simple substances and of their simple combinations, indicating their behaviour with the tests which yield characteristic reactions, and by means of which they may accordingly be identified. Such a dictionary, in my judgment, was absolutely required; for it is there only that the ope-

rator will find all the confirmatory tests to which he is referred in the Tables, and to which it is necessary that the substances found by him should respond before he can confidently trust his analysis; for it is only when a substance exhibits all the phenomena peculiar to it, under the influence of its appropriate tests, that the proof of its identity becomes irresistible.

"In the other dictionary will be found the names of the re-agents used in chemical analysis, the manner of preparing them for the laboratory, of ascertaining their purity, and their action on the simple bodies, and on their simple combinations. The object of such a book need scarcely be dwelt upon; there is, however, one of its uses which, though less immediately obvious, will often be found, I trust, a very great help to the chemical student or analyst. I allude to the enumeration of the various precipitates produced by re-agents upon compounds, and by means of which the operator, from the observation of one of the reactions produced during the analytical process, may either obtain a clue to the nature of the substances which he will probably have to deal with, or rectify or abandon surmises which he would thus find at variance or incompatible with the phenomena observed."

We have a great liking for the tabulated form of registering and communicating information. Tables such as these of Dr. Normandy, like maps and charts, with which they are compared, are more eloquent to the accustomed reader than the clearest prose statement that can be written. Our readers will understand from the above extract the design and scope of the Tables, and they will understand, too, our preference of the Tables to such a style as this extract exemplifies. We are glad, indeed, that *literary* style has not much to do with the merits of the present work. A good style for scientific statement, at once rich, clear, and accurate, is seldom met with. Some writers produce books in a style clear as crystal, but containing so little information that accuracy or inaccuracy is of no importance whatever. Others adopt a style very rich, perhaps, but so incomprehensible that even a legal practitioner of Philadelphia could not unravel its meaning. These faults, however, cannot be found with the Tables before us. For the professed student, and for those who are sufficiently versed in elementary chemistry to understand the symbols and language of that science, this Atlas will form an invaluable book of reference. It would be easy to eulogize the work very highly, and it would be just to do so; but we content ourselves with stating that it is by far the most elaborate and perfect work of the kind that we are acquainted with.

AERIAL NAVIGATION.

BY COUNT OSCAR REICHENBACH.

[A subscriber writes to us as follows:

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Seeing that the subject of aërial navigation is again under discussion in the columns of your Magazine, I beg to request insertion for the inclosed article, which appears to contribute some new points of view as to the function of the quill in birds' wings, the action of electricity generated by the bird, &c. I forwarded to the author, more than a year ago, two copies of back numbers of the *Mechanics' Magazine*, containing the description of Mr. Henson's aërial carriage, whereon he sent me this article as a reply. I kept it for about a year in my desk. The author is Count Oscar Reichenbach, of Silesian Prussia, living now in Norristown, near Philadelphia, U.S.

I am, Gentlemen, yours, &c.,

R. SCHRAMM.

The foregoing note will sufficiently explain the nature and objects of the following paper.—EDS. M. M.]

SIR,—Will you permit me to state my views on the above subject with reference to Mr. Henson's aërial carriage, as described in the *Mechanics' Magazine?* I agree with Mr. Henson, that less power is required to sustain the body in the air than to raise it from the ground, and that with an initial velocity unlikely to be obtained, it might for a while continue its course; but that would not constitute flight, but projection only, the more powerless against headwinds the more bulky the frame. The best flying animals have the smallest possible proportion of surface of body to volume embraced, of which the necessity to cut the air with the most ease will admit. Their propelling instruments only are large, but offer also the greatest possible surface of convenient form, extended over the smallest possible area when folded. The shape of the bird, or of the fish, which must correspond, has been imitated successfully in maritime navigation; it should remain the model in aerial navigation.

Animals flying upward from the ground ascend on an inclined plane almost perpendicular to the line of rest, so, indeed, as not to touch the ground with their wings, but get the greatest volume of air under them. It costs them, certainly, more effort to rise so than to fly horizontally, or to descend, or to rise in mid air from an object projecting into the air, like the branch of a tree; but as long as one should want an inclined plane to traverse the air, he would not be able to fly. The animal has its legs to dress itself up; these only must be imitated in

the air ship; they can be pulled up to it when it has left the ground, and let down when it returns, grasping into the soil for anchorage, like the talons of an animal.

Mr. Henson gives to his frame and his "vanes" a great surface in proportion to the strength of the original motor. There must be a proportion in the strength of the motor and the extent of the rudder. Increased extent of wing, and consequent increased tendency to press off more air, leads to loss of rapidity in the motion, the motive power remaining the same. Rapidity and height of strokes must be in proportion to length and width of levers. I suppose that for aërial navigation the strokes should be one-half as high as the wing is long; they must be more rapid than the rate of falling by gravity, less the influence of the sustaining medium through the extent of the stroke. I cannot consider wheels of any kind effective for motion of an object immersed in the same medium, at least for upward tendency, even with the most skilful arrangement of their single parts, which have to be brought to different positions during each revolution. Mr. Henson has, it seems, made his vanes like his frame, flat; the best flyers amongst animals have them convex or concave. He has made them as light and thin as can be, hardly strong enough to brave the winds; the best flyers have them neither lightest nor thinnest. Mr. Henson proposes steam as first motor. I have no objection, as it must be the motor till it has been superseded, for flight at least (if fly one should), by electro magnetic or another new power.

Animals do not fly by specific weight alone, which Mr. Henson has entirely rejected; nor by simple mechanical motions with certain propellers; certainly least of all by initial velocity; but these advantages concur in their organization for flight; nature has many ways of attaining her aims.

Flying animals have a particular vital power, which at once I call electricity, bent in its application to the aim of flight just as it operates in the movements of non-flying organisms for other purposes. Birds are the best flyers amongst animals. To know how they do it one should study electricity, and resort to the microscope. I may be told that we do not receive from a bird electric strokes, and that we are not aware of strong electric currents existing on its surface. This proves only that electricity is diffused, and certainly at rest when the animal rests.

The bird is covered with plumage; so the air ship, except the deck, should have an outside coat of a thin non-conductor, like india rubber sheeting, held, by the inflation of a light gas, apart from the inner body; this interval of small extent would wrap the ship in a coat balloon. This gives a trifling advantage in regard to specific weight, but obviates considerably the force of a fall, as the elastic medium without is pressing on the gas within. The wing of a bird is convex above, and therefore penetrates the air easily, while, being concave below, it presents a large surface over a small extent, and compresses the air in itself and between the wing and the body. The pen resembles in its rib a semi-elastic lever, more durable in the wind than a more rigid one. It has a quill, on its outside a bad conductor; inside it is hollow, and filled with a light gas, or is a mere vacuum. It is fitted with a membrane, a small pail chain, which is probably the most considerable, or the only immediate generator of friction, pressure, decomposition, electricity (the whole process of life is naturally the immediate generator, or general feeder of this electricity,) which is conducted by the marrowy substance of the rib into the barbe. This quill has to be imitated, but an apparatus for the immediate generation of electricity has to be placed in the bulk of the ship, whence it is conveyed to the wings by isolated conductors, (electricity flowing from the whole body would help its sustenance). The barbe of the pen is a fine tissue, the threads running from both sides of the ribs, having again lateral filaments opposite each other. All these threads form a surface, but not a continuous web, particularly on the under surface; the long and the small threads form a multitude of apertures open to the entrance of the air, like the points of the wing and the sides of the pen; all this infinity of small points bend downward. It is known how rapid a rotatory motion can be produced by electricity issuing from bent points. So the electricity generated by the bird flows to its wings (and its tail) and streams through all the points there into the ill-conducting air, which so becomes a resisting medium, and must lift the wing by countershock, and with this lever, which ends in the body of the bird, the whole bird. To the single repulsion of the flowing currents is added the depression of the lever into the non-resisting, not lighter, but antipolar medium, with all its possible velocity and repetition of depression. The bird generates electricity only when going to fly, and when flying. There seems to me much likeness between the membrane in the quill of the bird and the electric organ of the gymnotus. Flying quadrupeds, fishes, and insects have also their hollow tubes extending through their wings, &c., and a feather duct or protuberant pores at their points.

I propose, then, to give to the air ship a

convex or concave wing, with hollow (vacuum) ribs. There could be an arrangement inside which, by friction against the sides of the tubes, would become productive of more electricity, and serve at the same time to alternate the centre of gravity of the wing. The ribs are joined by a surface, which is generally non-conducting, and not apt to remain wet, having below edges and cross edges. All this non-conducting surface is sustained by a network of inclosed conductors (or vacuum conductors), which project from it in points. Birds, too, seem to have their conductors protected by a kind of varnish which, while non-conducting, at the same time keeps off humidity.

Let us imagine we hold submerged in water a hollow cone, open at top and bottom, from the periphery of whose end blows a strong current of air towards an opposite air-cone; if we depress it still further we should experience an apparent resistance or diminution of weight when the cone is of heavy material; the water will be chased through the top, and the air itself will ascend in the cone, lifting it upwards. Now I have remarked that the lower surface of the bird's pennal texture is full of apertures, surrounded by those points from which the electric currents must flow; they form such cones as I have mentioned, and act similarly.

What we have to look for when we want to fly is to diminish all resistance contrary to our intended direction of motion, and to gain a point of resistance in the direction opposite to that in which gravitation attracts us. In flying horizontally we divide resistance. We need less force to be exerted against gravitation, but we have also less power to destroy its effects; and we must find resistance in the direction opposite to that of the intended flight, and bestow there a corresponding part of our power. This is the reason why the bird in ascending rapidly inclines its whole body from the earth, striking with its wings only partially in the direction of gravitation. The attraction is not more powerful because it takes effect over a greater surface of the attracted body; but the attracted body, being extended, loses (in the air) in its own gravity its central power, its strength; and to this law animal strength is also subject. Certainly the more we are able to increase the velocity of our horizontal flight, the more we gain in power; that is, in power of muscles, or machinery, because the centrifugal power then diminishes more and more the effect of gravity.

We have to imitate the above arrangement of the wing. We must give it a depth through which these cones are managed. The microscope will enlighten us, and let us know if the cone is the best form, or whether a lengthened ellipsoid, open above and at the lower side, and cut through the opposite foci, is preferable. In nature the pens are partially superposed, and the number of wings (*spuriæ alalæ*) is more than two. I think this worth imitating.

I cannot tell without experiments what quantity of electricity one might produce to obtain a result which would make aërial navigation a useful invention; but I have the conviction that proceeding, guided by the above views, we must obtain some successes, however trifling in proportion to the exertions made, and gain a little more of scientific insight into the nature of flight.

When we have once found in the air a sufficient means of support, and a medium of sufficient resistance to the power of the motor—when we are once able to rise otherwise than by mere specific lightness, all difficulty will disappear. To govern the vessel so as to follow given directions is another matter. The principle established, all the rest consists in simple mechanical contrivances within known limits.

OSCAR REICHENBACH.

Norristown, near Philadelphia, U.S.

ROUGH MECHANICAL NOTES OF A TRIP TO HAVRE AND PARIS.

(*From a Correspondent.*)

CAPTAIN SMITH, the intelligent commander of the South Western Company's splendid new steamer *Havre* invited us on board to see his fine vessel. Our particular attention was called to her engines. They are on the atmospheric principle: that is, the pressure of the atmosphere is employed to drive the piston down, steam being used only to lift the piston. Captain Smith spoke in the highest terms of their performance and the extraordinary saving in fuel. This latter is a very important consideration, and would suggest the use of their engines in ocean steam ships. Perhaps some of your readers may give further information concerning this plan of applying steam power. The *Havre* is fitted with Mr. James Dibble's ventilating apparatus. We remember finding the benefit of this very complete system of ventilation in one of the company's other steam ships some years since, in a stormy voyage across the Channel, when everything was closed, and when, from the large number of passengers on board, we expected an atmosphere like the slave deck of a slave ship, but which, to our pleasing surprise, remained sweet and comfortable throughout the night. It is an admirable plan.

We could not but admire the improve-

ment which the French have made, during the last twelve years, in the models of their ships. They appear to have struck out a form combining the old French mode with the improved American clipper's lines, and the result has been a very beautiful form of vessel. Much praise is due, we believe, to M. Norman, of Havre, for the intelligent assistance which he has given to this mode of improvement. M. Norman is a naval architect of no ordinary pretensions. His dock-yard would nearly measure itself, both in size and mechanical conveniences, with any of our own private yards. We remember seeing a beautiful invention at work in his establishment last year for cutting circular timbers; it was the design of one of his sons. M. Norman's ships have the reputation of being faithfully built ships; indeed, he will not build any but high class ships. We observed some very handsome ships in the docks, built at Nantes, which has lately become a great building place.

The French are availing themselves extensively of the advantages of the invention of our countryman, Mr. Cunningham, for reefing topsails from the deck. We noticed a considerable number of ship fitted with this admirable system. We also observed a plan on board some ships for a similar purpose invented by a Frenchman. It is a modification of Mr. Cunningham's system, the same principle being used; only two yards are employed, one beneath the other. It looks exceedingly clumsy, and it is doubtful if any sound advantage has been obtained by it.

The French are anxiously trying to arrive at some perfect kind of steering apparatus. Several beautiful arrangements may be seen on board their ships.

It is a matter of surprise that in a port like Havre, offering so many facilities for *dry docks*, especially in a considerable rise and fall of tide, there are no conveniences of that description; a floating dock only, upon which ships of limited burthen are lifted, is stationed in one of the basins, and the principle upon which this is designed is worthy of remark. The water from the lifting chambers, instead of being pumped out, is *driven out* by the pressure of air forced into the chambers by steam power. It is extraordinary how quickly the dock, with the ship within it, is raised. Every convenience for heaving ships down is provided in the dock, and that is the usual mode adopted for repairing ships under water. A great improvement has been lately made in the town of Havre by the demolition of the old ramparts.

The French have a decided talent for order. We were struck with this at the goods station at Havre. Instead of goods from and to different towns and parts of the country being received indiscriminately in one large warehouse, as is the routine in England, at Havre you will see a distinct goods shed allotted for each important town of the country. There you will see one marked Paris, another Nantes, another Bordeaux, &c.; and although, in the passenger traffic, the arrangement of shutting up the passengers in separate rooms, and only admitting class after class to enter on the platform after each previous one has been stowed in their respective carriages, appears harsh and incompatible with our free ideas, there is unquestionably much advantage in it. It is true that the lingering look and parting farewell cannot be indulged in to the moment when the train moves off; but it effectually shuts off from the platform rogues and pickpockets, who avail themselves of that time, when the passengers' attention is absorbed, to practise their depredations.

We observed that the bugle is used by the guards of the train instead of the whistle. It may be questioned whether it has any advantage over the latter; but the French are so fond of everything military, that it is doubtful if they would condescend to use the dog whistle.

Our notes were intended to be on mechanical subjects; therefore we hesitate expressing our pleasure at the improvements which have been made in Paris since we last visited it twelve years ago. The Rue de Rivoli, as it now stretches its tall houses for miles and miles, is a surprising specimen of architectural vastness and beauty. We could not help feeling some little national jealousy when, looking at the beautiful fountains in the Place de la Concorde and elsewhere, we remembered that our hydraulic engineers have not hitherto succeeded in producing anything like these fine specimens of hydraulic mechanism; for, although the fountains in the Crystal Palace gardens have been made to throw water to a vast height, by the expenditure of an immense sum of money in raising the water, still they want that variety of beauty and combination so striking in the fountains in and about Paris. We would wish to see this subject taken up by some of the readers of the *Mechanics' Magazine.*

Strolling along the side of the Seine, in the neighbourhood of the Pont de la Concorde, we came to the railway omnibus, of vast proportions, which runs on a railway, and is drawn by two horses. The proprietor of this speculation is, we believe, an American, and, after some difficulties, obtained permission to lay down a line of rail from the Pont de la Concorde, for I believe about three miles. The carriage holds

about forty persons, and the fare of the whole distance is four sous. We were given to understand that it is paying well. There was no doubt but that it was full, every part of it, whenever we saw it depart. This is really suggestive of similar means of transport in several parts of London. Why could not a line of rail be laid down on the Commercial-road, for instance? The fare by the Blackwall Railway is high, and many a poor man would be glad to save his twopence if another means of transport were afforded.

We alluded before to Cunningham's plan of reefing topsails from the deck. That gentleman appears to have set the nautical world astir upon reefing topsails, and the French are evidently trying hard to rival our countryman. One of the first things which met our view, as we walked down the Place de la Concorde, towards the Pont de la Concorde, was a patent self-reefing topsail, fitted on the main topsail yard of the school frigate moored on the Seine, now used as a restaurant. This plan of reefing is the invention of a French captain. It consists of three yards, two of which are wooden, and the third of iron. Cunningham's principle of employing the gravitation of the yard, and to produce rotation, is applied to the iron yard or spindle, which communicates rotation to one of the wooden yards by cog-wheels at the ends. There is also a plan for hauling out the leech by a screw on the iron yard. Nautical men must judge for themselves how this combination of yards, spindles, cog-wheels, and screws will answer practically.

Although painting can scarcely be included in our mechanical notes, we cannot refrain from jotting down a word or two upon what we saw at the Exhibition of Living Artists in the *Palais d'Industrie*, or the part which remains of that edifice. Long, long will the impression of some of those beautiful paintings—those life-like specimens of art—remain impressed on our memory. Among so many exquisite pictures, it were difficult to particularize individual ones, although we thought that the painting of the Trappist monk kneeling on the Zouave's grave was the perfection of art. The specimens of chromo-lithography were very good, particularly those by Thurwanger; and the French have evidently not lost their talent for engraving: there was a beautiful plate of the "Trappist Monk" before alluded to, by Jazet; another of the Holy Family, after Raphael, on wood, by Gauchard. Amongst the architectural designs may be mentioned several by Battarei, Delacours, and Van Cleemputti. We observed that the side galleries of the basement of the *Palais* have been fitted with horse-stalls capable of accommodating many thousand horses—an admirable place for collecting a large body of cavalry in the event of insurrectionary trouble.

On our return down the banks of the Seine to Havre, we observed that the old, strange-looking steam-boats which ply up to Rouen, having their paddle-wheels placed at their sterns, are giving place to screws; although we imagined that, for ascending the stream, the paddle-wheel would be a more complete propeller. It is possible many a traveller will have remarked, about a mile from the station at Paris, a large cleared-away space, having on it a sign conveying the startling intelligence that it is intended for the "Napoleon Docks!" Did the Emperor really ever seriously contemplate the formation of docks at Paris? We give his Imperial Majesty every possible credit for energy and indomitable perseverance in carrying out schemes of magnitude and difficulty, but, until the bed of the river Seine assumes a far different character to what it does at present, we fear that the Paris Docks, although completed, will never show a forest of masts within them; and that the digging away of the bottom of the Seine sufficiently to allow ships to navigate it, would not be a completed work, at any rate, in our generation.

THE SOUTH KENSINGTON PATENT MUSEUM.

When, in our last number, we urged inventors and others to contribute models, portraits, &c., to the Patent Museum, at South Kensington, we had not observed a circumstance which has since come to our notice, and which, if allowed to continue, will prove the ruin of that branch, at least, of an undertaking of great promise. We allude to the prohibition of public access to the museum from Tuesday to Saturday of each week, except on payment for admission. How the Committee of Council on Education can for a moment imagine that inventors and patentees will send articles for exhibition under such an arrangement, we are at a loss to conceive. Nor can we help feeling that a breach of faith, or something very like it, has been committed in respect to those gentlemen who have exhibited models, etc. there, for they certainly never contemplated the imposition of an admission fee, and we are confident they will speedily withdraw their contributions unless that fee be abolished. The Patent Museum should undoubtedly be public, and free to the public, on every day of the six, when open at all, and if the Committee of Council on Education are either too exclusive, or too parsimonious, or too aristo-

cratic to make it so, the thing had much better come to an end at once. There is far too much exclusiveness already manifested in connection with our public museums and libraries, and if the Patent Museum at Kensington is to afford another example of it, we shall not regret its dissolution. It may be all very well, in some instances, to thin visitors by taxing them, in order to keep places select for special purposes, but there is no reason whatever for the practice in the case before us. We recommend our readers to wait a few weeks for the removal of the admission fee, and if it be not then removed, to withdraw their models, so that the members of the Educational Committee may remain as the sole curiosities of the place. We appeal to Mr. Woodcroft, who has sent the chief portion of the models for exhibition, or if he have not the power, to the Commissioners of Patents, to aid us in effecting the removal of the unnecessary and annoying impost of which we complain.

MISCELLANEOUS INTELLIGENCE.

A Novel Railway System.—Mr. J. B. Humphreys, C. E., of Rio de Janeiro, has recently patented a novel arrangement of the parts of railway trains intended for conveying goods and passengers up steep gradients, where the present system of traction by locomotive engine power is difficult and expensive, or entirely inapplicable. Instead of one or more locomotive engines of great power and weight, a series of trucks are each fitted with steam engine cylinders, by the action of the steam in which motion is communicated to the wheels of such trucks or carriages, and the steam necessary for commucating the power may be conveyed from the boiler of a locomotive traction engine in the front of the train, to the trucks composing the train by means of suitable steam pipes; or a separate boiler is mounted upon each of several suitable trucks, disposed in consecutive positions throughout the length of the train, according to the number of steam trucks composing such train.

Propulsion of Ships by Steam.—N. Ogle, Esq., R. N., of Jersey, has issued the prospectus of a method of propelling ships by steam (for which he has recently obtained provisional protection). He proposes to dispense altogether with paddle-wheels and screw propellers, and employ solid metal pistons acting directly against the water at or near the stern of the ship. In connection with each piston is a chamber, into which the air is admitted, and from which it is exhausted alternately, the exhaustion being effected by a steam engine. The atmospheric pressure forces the pistons out against the water, thus propelling the ship; and when this pressure ceases (because of the formation of the vacuum), the pressure of the water returns the piston to its first position. The action of the air engine is also intended to aid in ventilating the ship by causing air to rush down into the engine room to supply it. Ordinarily the inventor proposes to supply the stern propellers only, so that the ship will be propelled ahead only by them; where required, however, he would apply similar propellers to the bow. He considers the arrangement especially applicable to yachts, to be used as a source of auxiliary power in calms.

Composing and Distributing Type by Machinery.—On Monday last was filed the specification of a patent which we have obtained for Mr. T. Alden, of New York, for improvements in setting and distributing type. The invention consists of a highly ingenious machine, partly automatical in its operation, and partly worked by an attendant. The purely automatical part lies in the type-distributing operation, while the setting of the type is governed by the attendant. By means of it both setting and distributing may be going on at the same time, or separately. A machine of which the functions are so varied must of necessity be composed of many parts, having more or less complexity both in construction and operation. The specification in question is nearly three hundred and fifty folios of seventy words each in length, one of the longest ever filed, and has annexed to it a series of very elaborate drawings.

Wrought Iron Railway Carriages.—We learn from the *Scientific American* that there is now nearly completed in Patterson, N. J., a railway carriage constructed almost entirely of wrought iron. This material is employed to obtain great strength, with less weight than usual, and to avoid the serious injuries which generally occur to passengers in collisions with carriages of the ordinary construction. The framework of this wrought-iron carriage is in effect an extremely strong and stiff, yet elastic, basket, each joint or intersection being strengthened by rivets, and the whole being further protected by making the entire platform at each end one strong spring of steel. Should this carriage come into collision with another in such manner that the springs at the ends cannot absorb the shock, the carriage will itself spring, collapse, twist, or crumple up, but cannot break and crush its contents with the fragments. One of the great dangers from collisions, &c., is the disposition of ordinary carriages to penetrate each other with their timbers, but this and many other minor evils are avoided in the improved carriage.

THE NEW INDUCTION COILS.

To the Editors of the Mechanics' Magazine.

128, Sloane-street, June 29, 1857.

Gentlemen,—"The extraordinary discrepancies" of which Mr. Hearder complains in your last number, did not originate with *me*. If Mr. Hearder choose to believe the verbal remark of a gentleman who was certainly misinformed, and whose name I do not know, that is no reason why he, Mr. Hearder, should try to throw discredit upon any statements of mine which have been published.

Mr. Hearder asserts, that every tyro would know how to apply gutta percha and oiled silk for insulating coils. In answer to this, I refer him to the letter of your Birmingham correspondent, which is inserted immediately after his own communication, and he, Mr. Hearder, will see, that every electrician does *not* know how to apply these insulating materials.

Mr. Hearder again remarks that my coil is almost identical with his own. I will point out an important difference, which may be useful to some of your readers. Mr. Hearder winds his secondary wire upon a gutta percha bobbin, and brings the wire close to its cheeks; now I adopted this method myself at first, but found that the sparks traversed the interval between the upper layer of wire and the lower one. To prevent this I discarded the cheeks of the bobbin, and wound my wire, so as to make each succeeding layer shorter than the one beneath, thus gaining space at the ends, over which the spark could not leap. It was the adopting this arrangement that enabled Mr. Ladd, of Chancery-lane, to obtain sparks 4½ inches long from a coil constructed by himself. This instrument was excited by five cells of Grove's battery.

I trust Mr. Hearder will allow this discussion to cease, or leave me the chance of not trespassing so much upon your Magazine; and indeed I should not have troubled you so much, had it been a question of priority of invention, but, of course, it was but right to defend myself from the imputation of dishonesty.

I am now constructing a coil which will require 100 lbs. of wire for its completion, and a detailed account of the results elicited, will, I trust, be some recompense for the present infliction.

I am, Gentlemen, yours, &c.,
C. A. Bentley.

PROPERTIES OF NUMBERS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Will any of your mathematical readers examine the subjoined problem, and offer a satisfactory reason why it is incapable of solution by the ordinary algebraic method of x and y. A curious property of numbers seems to be involved.

Problem.—"The dimensions of a rectangular garden are such, that if its length were diminished and breadth increased 3 yards, its area would be 3 yards more; but if length were diminished and breadth increased 5 yards, area would be 5 yards less. Required the dimensions.

The same anomaly will be found to present itself in every similar question, where length and breadth are increased and diminished by the *same number*.

I am, Gentlemen, yours, &c.,
Holly Bank.

[The two conditions given opposite are not independent. They amount, in fact, to only one condition, and the equations which they furnish are identical; either may be known from the other. In fact, any garden whose length is 4 yards greater than its breadth would satisfy the requirements of the problem. Our correspondent should not, then, be surprised that he cannot determine the absolute dimensions of the garden from such data.—Ed. M. M.]

THE ARCHIMEDEAN BALLOON.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I must beg permission to reassure "An Amateur" that I never proposed a covering to any part of my aërial paddle wheels; and further, that I never made use of the term "arc covering," or employed the phrase "shift the arc round." The "certain arc" which I have spoken of is a physico-mathematical term, denoting the arc in which the paddle-wheels of the Archimedean balloon beat the air. It is, in fact, the arc of impact.

It is true that an elongated framework forms part of the plan of my navigable balloon, but I never wrote anything to indicate that the balloon would be placed inside the framework. I distinctly called the framework a "hull," and specified that the balloon should be "arranged parallel with the hull, and at as slight an elevation above it as may be practicable, the balloon and the hull to be connected by ropes."

"An Amateur" remarks, "So I think the question may now be considered pretty nearly set at rest; and I trust Mr. Pitter will hasten to acknowledge his obligation to me." I think it would be only decorous for "An Amateur" first of all to "hasten

to acknowledge" how unfairly he accused me of plagiarism when he said, "It is clear that the *Great Eastern*, now building, is the model upon which your correspondent has constructed *in his mind* his wonderful Archimedean and paddle-wheel balloon." I have proved that this "clear" deduction is chronologically impossible, and yet "An Amateur" goes on to fasten upon me the crude misconceptions of his own brain, and complacently hopes that I shall confess my obligation to him for "pretty nearly settling" the question!

I am glad to acknowledge that "An Amateur" has at last made a remark which has some relation to my machine, though the objection is without force. He confidently declares that an elongated balloon can never be balanced. If he refers to the description of my machine, given in the *Mechanics' Magazine* for June 5, 1847, and June 10, 1848, he will perceive that my two pairs of paddle-wheels are so contrived as to meet this difficulty, inasmuch as they can be arched so as to elevate or depress either end of the machine, without interfering with the function of propelling.

I am, Gentlemen, yours, &c.,

J. Pitter.

254, High-street, Borough, London, S.E., June 29, 1857.

[We cannot permit this discussion to be further prolonged in our pages.—Eds. M. M.]

WATER GAUGES FOR BOILERS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—The observations made at page 615 of your last number by a practical engineer of Newcastle-on-Tyne, that many water gauges of a similar kind to mine have been in use in the neighbourhood of Sunderland for years is untrue, and his referring to Bywell-on-Tyne, about twenty-four miles from here, is a proof of it. If he knew the method of making a gauge on this principle, it seems odd enough that he has not done so before; but if he considered it a useless invention, why should he trouble himself about it, now that he sees it can be made of practical utility. My gauge has been submitted to the inspection of most of the engineers of the county of Durham, who have not seen anything like it before, and highly approve of it.

I am, Gentlemen, yours, &c.,

Thos. T. Jopling.

Sunderland, June 30, 1857.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Armstrong, J. *Improvements in the permanent way of railways.* Dated Oct. 28, 1856. (No. 2530.)

These relate—1. To the crossings, and consist in making the wing and point rails of crossings in one piece of cast steel (or other material), and double-headed. The crossings are further so constructed that the flanges of the wheels take a bearing in passing off the point rail on to the wing rail. 2. To the permanent way, and consist in constructing a girder rail with two side brackets or bearing pieces on each side of the rail, the side brackets forming a taper recess in the side of the rail, wherein corresponding pieces of timber are forced, and held in by bolts, upon which pieces of wood the rails rest.

Russell, S. *Improvements in the manufacture of teapot-handles, knobs, door-plates, finger-plates, razor scales, and knife-handles.* Dated Oct. 28, 1856. (No. 2531.)

This consists principally in combining horn with mother of pearl, ivory, silver, or other metal or material in the manufacture of teapot-handles, knobs, door-plates, &c. It further consists in an improved mode of connecting such handles to teapots, by screwing metal ferrules on to each end of the handle, and afterwards soldering the ferrules to the teapot.

Aubril, A. *The novel application of a certain root to the manufacture of starch, paper, and cardboard.* Dated Oct. 28, 1856. (No. 2533.)

This consists in the employment of bryony for the manufacture of starch, paper, and cardboard.

Faure, L. A. *An improved pump.* Dated Oct. 29, 1856. (No. 2538.)

This consists of a cylindrical square box, having a metallic top, and a similar base; these are bolted together by bolts from top to bottom. This forms the air chamber of the pump. Within this chamber, and eccentric to it, is the pump barrel—a cylindrical tube placed vertically. The pump may be either double or single-acting; if the former, another tube of smaller diameter than the barrel, passing from the top to the bottom of the air chamber, puts the top part of the pump barrel in communication with the water supply. The inlet pipe connecting the pump with the water supply, enters at the bottom of the platform and within its mouth, and partly within a chamber formed in the platform, into which the mouth of the inlet pipe enters, are placed two inlet valves. This last-mentioned chamber is in communication with the bottom of the barrel, and is separated from the air

chamber by a plate, which serves for the seat of two outlet valves opening into the air chamber. The barrel of the pump, which is worked by an air-tight piston and piston rod, is thus in direct communication at its bottom with one compartment containing one set of valves, while its top is in connection with the other compartment containing the other two valves.

SALT, T. C. *A new or improved method of coating with glass, or enamelling surfaces of cast iron.* Dated Oct. 29, 1856. (No. 2539.)

The enamelling of cast iron, or coating it with glass, is effected by the use of pounded glass enamel, applied by gum-water, and afterwards fused.

JOHN, T. *A new electric-telegraph apparatus for writing.* Dated Oct. 29, 1856. (No. 2540.)

This invention cannot be described without engravings.

HENZELL, T. S. *Improvements in the construction of ships or vessels.* Dated Oct. 29, 1856. (No. 2541.)

Ships are built of straight timber; the bottom is flat, but rises slightly upwards at the stem and stern. There are three keels; the midship keel is quite straight, and the space between it and the bottom of the vessel at stem and stern is filled in with dead wood. The side keels are curved to the form of the bow and run of the vessel. The midship and sister keelsons are straight. The floor timbers run transversely, and the inner and outer floor planking longitudinally with a diagonal ceiling. The side timbers are straight and vertical, with diagonal planking, the inner and outer planking crossing in opposite directions. The vessel has sliding side keels or floats, which can be hove up or down, so as to give less or more hold upon the water, without increasing the immersion of the hull by means of ballast.

KOPKE, W. *An improved clasp-board to hold documents for reference.* Dated Oct. 29, 1856. (No. 2543.)

This consists in applying a common band of india-rubber to bundles of papers, whereby they are held together. The tie is made to press only over the papers.

JONGH, C. DE. *An improved method of, and machinery for, combing and preparing silk, flax, and other fibrous substances.* Dated Oct. 29, 1856. (No. 2544.)

The principal feature of this invention consists of travelling bands or chains of flat plates or blocks connected together by hinge joints so as to admit of their passing round pulleys, the endless travelling band or chain of blocks being actuated in any convenient manner. The silk is placed on this chain so that about one-half of its length projects beyond the edge, and is combed by drums carrying cards or teeth.

FAIRBAIRN, P., and R. NEWTON. *Improvements in machinery for dressing waste silk.* Dated Oct. 29, 1856. (No. 2545.)

This relates to improvements in the horizontal machine used for dressing silk waste. The patentees claim—1. Combining in one machine sets of travelling card surfaces for operating upon the silk consecutively. 2. Traversing the holders containing the silk through the machine in a direction parallel to the line of action of the carding surfaces to present the silk to those surfaces.

WHITAKER, F. *Improvements in apparatus for supplying water to steam boilers.* Dated Oct. 29, 1856. (No. 2546.)

A revolving plug is employed having several recesses in its circumference, which revolves within a case so that the water contained in the cistern from which the water is supplied cannot pass to the boiler, excepting so far as the water is received into and carried round by the recesses of the revolving plug. The plug is above the level of the water in the boiler, and a pipe passes from the apparatus into the boiler, its end being open; hence the water brought round by the recesses in the plug will only flow into the boiler when the steam passes up the supply pipe and fills the recesses in the plug as they come round.

WAY, J. T. *Improvements in obtaining light by electricity.* Dated Oct. 29, 1856. (No. 2547.)

This consists in the use for one of the electrodes of a substance such as mercury, which is caused to flow through an orifice on to a point of steel, &c. The mercury is in connection with one of the poles of the battery, and the points are in connection with the other pole, and are so arranged that the distance between them and the orifices from which the mercury escapes can be adjusted so as to bring the points to the level at which the streams of mercury break into drops. In place of using points of steel, &c., for the lower electrode, a regulated surface of mercury may be employed if desired.

WHITTEMORE, D. H. *An improved machine for paring, slicing, and coring fruit or vegetables.* Dated Oct. 29, 1856. (No. 2548.)

This invention cannot be described without engravings.

MAY, W. *Improvements in steam engine indicators.* (A communication.) Dated Oct. 30, 1856. (No. 2550.)

The patentee constructs a barrel which, for its rotary motion, is independent of any part of the engine; and he causes it to revolve for any given period of time through

regular intervals of space, by means of a chronometer spring fitted internally, and a governing ratchet wheel, the paper being wound on to and unwound from the external surface thereof; thus, in addition to the pressure cylinder carrying the recording pencil or style, he has another cylinder carrying the paper, which may either contain the aforesaid spring internally, or the paper may be carried on an independent reel or cylinder, and wound off, by means of a spring barrel, in which case the indicating pencil may either mark the paper or card whilst on or passing over or from the barrel, or whilst it is passing off one barrel on to another.

TORASSA, C. J. B. *An apparatus for calculating the speed of vessels at sea, as well as obtaining the extent of their destination caused by the side winds.* Dated Oct. 30, 1856. (No. 2551.)

The patentee adapts longitudinally to the ship below water a pipe open at both ends. A box is adjusted to this pipe, so that the water which passes through the pipe will pass through the box also. A valve is adapted inside the box, and is made to shift more or less according to the velocity of the water passing through the pipe. This valve is fixed on a shaft bearing a needle which indicates on a dial the speed of the ship. Another apparatus, somewhat similar to this, will indicate the deviation of the ship caused by side winds. This second apparatus is fixed so as to cross the former, and both are of metal.

HOLCROFT, H. *An improved steam engine, specially applicable to agricultural operations.* Dated Oct. 30, 1856. (No. 2552.)

This relates to an improved construction of steam engine specially adapted for the tillage of land, which engine is propelled by a traction screw or propeller. By the addition of pulleys it may be employed for driving machinery for manufacturing drainage pipes, for thrashing grain, and other agricultural purposes.

URION, L. *Improvements in match boxes or holders.* Dated Oct. 30, 1856. (No. 2555.)

This invention cannot be described without engravings.

LAWSON, J. *Improvements in the manufacture of pile and other fabrics.* Dated Oct. 31, 1856. (No. 2557.)

This consists in manufacturing terry, and other fabrics, by fastening a face consisting of worsted or other yarn on to a material to form a back by sewing the same thereto by machinery. In making terry pile wires are placed parallel to the selvage of the back, and the yarns to form the face laid across the wires, and attached to the back in between the wires by the thread of the sewing machine. The terry thus produced may be converted into a cut pile or velvet by cutting the loops, either by means of a knife on the end of the wire, or otherwise. In making a plaited fabric the yarns are laid transversely across the back, and are attached thereto in the same way, except that they are kept in an extended state in place of being drawn into loops over wires as in the former case.

GOODFELLOW, B. *Certain improvements in the construction of steam boilers, and in the mode of supporting steam-boilers on their seatings.* Dated Oct. 31, 1856. (No. 2558.)

This consists in slinging one end of the boiler so that the unequal strain on the lower plates is avoided, or in fixing longitudinal stays to the bottom of the boiler, or in connecting the lower part of the ends of the boiler by through stays, so as to render the lower part sufficiently strong to resist the injurious effects of the unequal expansion and the friction of the boiler on the seating.

MATTHEWS, F. C. *Improvements in preparing manure.* Dated Oct. 31, 1856. (No. 2560.)

Columbian guano is treated with sulphuric or muriatic acids so as to render it suitable for use as a manure, either alone or mixed with other substances.

HUTTON, H. *Improvements in lubricators.* Dated Oct. 31, 1856. (No. 2562.)

This relates to those lubricators which supply the lubricating matter through the intervention of cotton, worsted, &c., which, by capillary attraction, forms a syphon, and carries over the lubricating matter. The object is more readily to place the threads of cotton, &c., in position in the lubricator, and to more easily remove them when required. The patentee forms a separate tube detached from the lubricator, which is loosely inserted within the lubricator tube, and into which separate tube the threads are inserted before being placed in the lubricator. This separate tube is not entire, having a slit from end to end for drawing the conducting threads within it. This he effects by a pair of thin steel pincers, by which he takes hold of one end of the threads. The nippers are pressed down the slit in the tube with the points holding the threads within the tube. The nippers being carried quite through, leave the threads straight and clearly threaded through.

HUGHES, E. J. *An improved mode or method of concentrating the colouring matter of certain vegetable substances.* Dated Nov. 1, 1856. (No. 2563.)

This consists in subjecting vegetable substances, containing colouring matter, to the action of sulphuric acid, either in a con-

centrated state, or slightly diluted with water, keeping the mixture perfectly cool during the operation.

BROWNE, J. *Improvements in the construction and working of ships' windlasses and capstans, part of which improvements are also applicable for steering ships and other vessels.* Dated Nov. 1, 1856. (No. 2564.)

Engravings are essential to a detailed description of this invention.

PARBERY, J. *Certain improvements in horse collars.* Dated Nov. 1, 1856. (No. 2568.)

The patentee constructs the parts known as the hames. so that they shall constitute the ground-work of the collar, and they are so formed that they may be united at the bottom by a hinge-joint, and at the top by an adjustable screw, so that the finished collar shall be capable of being extended and contracted to suit the neck and shoulders of the horse. They are also capable of being altered in the line of draught, so as to relieve the shoulder or shoulders of the horse from undue pressure at any particular part.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

FORBES, H. F. *An improved copying press.* Dated Oct. 27, 1856. (No. 2517.)

This consists in giving the required pressure by two levers, fastened one on each side of the lower plate which supports the copying book.

FORDRED, J. *Improvements in lamps, in apparatuses connected therewith, and in manufacturing certain liquids for the production of light.* (Partly a communication.) Dated Oct. 27, 1856. (No. 2518.)

The inventor has found that taking methylated spirit for a base certain useful combinations with other hydro-carbons may be prepared and used for the production of artificial light. The inventor constructs lamps specially for burning the above with a reservoir for the fluid which he causes to rise to the desired height by wicks of cotton, asbestos, pumice stone, spun glass, or a combination of any two or more of them. He prepares the wicks for use in the lamp by previously encasing them in any thin metallic covering.

SCHAFER, P. and F. *An improved handle for desks, deed and despatch boxes, bags, furniture, and other articles to which handles are applied.* Dated Oct. 27, 1856. (No. 2521.)

The object here is to make a handle which, when released, shall be flush with the surface of the article to which it is applied. The handle is formed of leather, or other material, and lies in a recess, made for its reception, of such depth as that when the handle is at rest, it shall be flush with the sides of the case or recess.

NEWTON, W. E. *Improved means of economizing the waste heat of furnaces or fireplaces.* (A communication.) Dated Oct. 27, 1856. (No. 2522.)

This is effected by the employment of metallic pipes, which are heated by the smoke passing through them, and transmit the heat to a column of cold air.

SIMPSON, E. T. *Improvements in the manufacture of soap.* Dated Oct. 28, 1856. (No. 2525.)

The documents relating to this invention are with the law officers under objection.

GILBEE, W. A. *Improvements in the construction of smoke-consuming furnaces.* (A communication.) Dated Oct. 28, 1856. (No. 2529.)

These relate to a peculiar construction of furnaces in which superheated steam is injected upon the incandescent fuel.

CHEETHAM, J. K. *Improvements in the manufacture of iron and steel.* Dated Oct. 28, 1856. (No. 2532.)

This consists in oxidising or partially oxidising iron by admitting aqueous vapour, or other source of oxygen thereto when in a heated state, but under the fusing point, that is to say, before the metal becomes fluid; it is then fused in any ordinary manner.

ROBINSON, R. *An improvement or improvements in machinery or apparatus for sizeing, dressing, finishing, and polishing yarns or threads.* Dated Oct. 29, 1856. (No. 2534.)

This consists of a revolving fan, the circumference of which is furnished with a number of bars of wood or metal, either plain or grooved, or are covered with a woven fabric of a piled or tufted description. The whole is covered with a case, except at one part, where the bars are brought into contact with the yarn during the process of finishing. The yarn being first sized, &c., is placed in the machine, and being stretched and put in motion, is brought into contact with the outside surfaces of the bars. The fan being made to revolve rapidly, friction is produced on the yarn, and at the same time a stream or blast of air from the fan is directed upon it.

HAMPSON, R. *Improvements in lubricating steam engines.* Dated Oct. 29, 1856. (No. 2535.)

The documents relating to this invention are with the law officers under objection.

GARNETT, T. *Improvements in the manufacture of paste or size for sizing, stiffening, or otherwise preparing cotton and linen yarns and woven fabrics.* Dated Oct. 29, 1856. (No. 2536.)

This consists of using compounds of soda

and magnesia, combined with paste made of flour or starch, or other substances, for dressing cotton or linen warps.

WYCHE, T. E. *A method of disengaging metals from the matrix.* (Partly a communication.) Dated Oct. 29, 1856. (No. 2537.)

The inventor takes the quartz in which the metal is imbedded, breaks it into pieces, puts it into a steam-tight boiler with water, and adds caustic alkali. He then applies heat until the mixture boils, and continues the same under pressure until the alkali dissolves the quartz and frees the metal.

THOMPSON, A. J. *An improved gum-pot and brush, and which said pot and brush are also applicable for holding and using liquid glue, paste, or other adhesive materials, as well as varnish, paint, and such like fluids, which are liable to dry up by the action of the air.* Dated Oct. 29, 1856. (No. 2542.)

This consists in so forming pots or vessels that the mouth may be contracted and made with a projecting rim, and on the handle of the brush to be used is a cover, which may be fixed to the brush, or made to move on its handle in an air-tight packing. This cover fits the top of the pot, so that the brush, when returned after use, may be placed, with its cover, in such a way that it will close up and exclude the atmosphere from the fluid within.

MACALLUM, J. *Improvements in the preparation or refining of saltpetre.* Dated Oct. 29, 1856. (No. 2549.)

The crude saltpetre is first deposited in a chamber containing water, and agitated by jets of air, or by other means. When the cleansing is completed, the cooling for the deposition of crystals is effected by bringing currents of cold water into contact with the hot liquor. When the crystals are to be dried they are laid upon a plate, heated by steam or hot-air pipes, and this completes the articles for packing and use.

GIBBON, J. *Improvements in chaff-cutting machines.* Dated Oct. 30, 1856. (No. 2553.)

This consists in fitting chaff-cutters with a movable jaw or mouthpiece, which rises to allow a fresh quantity of material to be advanced towards the knife for the purpose of being cut, and closes down and holds the material tight while in the act of being cut.

SIMPSON, J., and H. SPENCER. *Improvements in lubricating steam engines.* Dated Oct. 30, 1856. (No. 2554.)

The inventors construct a channel within or around the piston rod, through which the lubricating substance passes and issues at the lower end; these channels may be in communication with a reservoir, and provided with cocks or valves opened and closed at suitable periods. The invention also consists in covering the piston face with felt or other such material, which will absorb oil conveyed thereto by the means described; or it may be supplied by a separate tube moving with the piston, and passing through the cylinder cover.

FERGUSON, C. A. *Improvements in preparing timber for ship-building, mast-making, and other purposes.* Dated Oct. 31, 1856. (No. 2556.)

These consist in preparing timber for ship building, &c., by charring the inner surfaces. After the timber is cut out, a large iron roller, made hot, is passed over the surfaces of the timber which are to be placed in contact with each other, until they are sufficiently charred, after which they may be put together and united in the usual manner.

WORSSAM, S., and J. GRIST. *Improvements in machinery for cutting and shaping wood.* Dated Oct. 31, 1856. (No. 2561.)

In the forming of felloes for wheels, &c., the inventor employs two band saws, and mounts the blanks from which the articles are to be formed upon a revolving platform, to which they communicate motion by toothed or other suitable gear. The machinery is susceptible of various arrangements according to the form of the timber required.

SMITH, P., and T. IRVINE. *Improvements in the masts, yards, and rigging of ships.* Dated Nov. 1, 1856. (No. 2565.)

The inventors fix permanently the lower topsail yards to the lowermost heads by iron bands or chains, and connect them to the lower caps, independent of and in no way attached to the topmasts. They reverse the caps on the lowermast heads, and place the topmasts on the after side of the lowermasts; thus the ship, in the event of the topmasts being carried away, would still be under close reefed topsails, courses, and staysails.

STOTT, B. *Improvements in machinery or apparatus for preparing, spinning, and doubling cotton, wool, flax, or other fibrous materials.* Dated Nov. 1, 1856. (No. 2566.)

This consists—1. In giving a traversing motion to the ordinary drag placed between the under sides of the bobbins and the upper side of the copping rail. The drag has a to-and-fro motion to prevent the cloth from being worn in one place, and to cause the drag upon the bobbins to be more uniform; the cloth or plate is connected to a band or chain passing over pulleys, the ends being fast to a main framing. 2. In a roving slubbing yarn breaker, a series of which, corresponding with the number of flyers, is placed at the back of the rollers.

YOUNG, J. *Improvements in flooring cramps and lifting jack.* Dated Nov. 1, 1856. (No. 2567.)

This consists in the application of the worm and worm wheel or tangent screw to effect the motion of that part of the cramp by which the boards are pressed together. The arm of the cramp which compresses the boards is a screw, and the screw box in which it works is made on its edge into a toothed wheel in which an endless screw or worm engages. By turning the latter with a winch the screw box is made slowly to rotate, and the screw to advance or retire. The same motion is applicable to lifting jacks.

WARNE, J. *Improvements in beer engines.* Dated Nov. 1, 1856. (No. 2571.)

One of the great defects of the engines known as Warne's patent beer engines arises from the pump-barrel being placed on a level with the counter, and from the oozing out of the liquor from the stuffing box at the top of the barrel. Here the pump-barrel is placed below the counter, the piston rod worked through the counter, and a double O G, or other suitable neck, is carried from the upper part of the barrel to some part below the counter and inside the bar.

MOORE, W. H. *Improvements in railway signals.* Dated Nov. 1, 1856. (No. 2573.)

This consists in arranging apparatus so that the passage of a train by acting on suitable instruments raises a stump which, if another train passes, comes in contact with instruments in connection with the whistle of the engine, so as to cause the same to sound. The stump, when raised, is retained in position for a suitable time, which is regulated by the escape of air or water through a small orifice. At the same time that the stump is raised a visible signal is also brought up, and this visible signal gradually descends as the air escapes from the regulating vessel.

JOBSON, J. *Improvements in the manufacture of railway chairs.* Dated Nov. 3, 1856. (No. 2575.)

This relates to modifications of machinery for producing moulds for casting railway chairs, for which letters patent were granted to the inventor, 23rd Nov. 1855. In the former invention the patterns were described with sliding pieces, by withdrawing which recesses were left, into which other movable pieces were caused to withdraw so as to admit of the mould being removed from the pattern. These last-mentioned movable pieces were controlled in two different ways; —by turning upon pins, or by being mounted upon levers like a parallel ruler. By the present these parts are controlled by slides, or other guides, which may be of rectilinear, or other form.

PROVISIONAL PROTECTIONS.

Dated March 5, 1857.

650. Thomas Jefferson Thompson, of Greenwood-park, Newry, Ireland, mechanical engineer. Improvements in the construction of gasometers, whereby they are rendered applicable to lighting railway carriages.

Dated April 6, 1857.

964. John Slack, of Manchester, manager. Improvements in lubricating certain parts of looms for weaving.

Dated April 28, 1857.

1200. David Chadwick, of Salford, gentleman, and Herbert Frost, of Manchester, machinist. Improvements in apparatus for measuring water and other liquids and gas, applicable also to the purpose of obtaining motive power.

Dated May 6, 1857.

1286. Peter Armand Lecomte de Fontainemoreau, of London. Improvements in the preservation of grain and alimentary substances in general. A communication.

Dated May 12, 1857.

1342. William Massey and John Smith, of Newport, engineers. Improvements in machinery for ploughing and cultivating land.

Dated May 15, 1857.

1376. Henry Schmidt, of Rue St. Honoré, Paris. A new apparatus for advertising in railway carriages, omnibuses, cabriolets, and other vehicles, and in theatres and public places.

Dated May 16, 1857.

1386. Henry Jones, of Birmingham, manufacturer. An improvement or improvements in engines for raising beer and other liquids.

1388. George Henry Creswell, of Devonport. Improvements in apparatus for supplying ink or other mixture for stamps used in stamping letters and other articles.

1390. Charles Cowper, of Southampton-buildings, Chancery-lane. Improvements in preparing solutions and extracts of the colouring matter of madder and other tinctorial substances for dyeing and printing. A communication from F. Mitscherlich, of Eilenburg, Prussia.

1392. William Hill, of Carlisle, Cumberland, brakesman. Improvements in railway brakes.

Dated May 18, 1857.

1394. Rudolph Bodmer, of Thavies-inn, Holborn. Improvements in locomotive steam engines. A communication.

1396. Isac Louis Pulvermacher, of Paris, engineer. Improvements in pipes or tubes for smoking.

1398. James Apperly, cloth manufacturer, and William Clissold, engineer, both of Dudbridge, Gloucester. An improvement in carding engines and in condensers applicable thereto.

Dated May 19, 1857.

1402. Thomas Welcome Roys, of Southampton, New York, master mariner. Improvements applicable to explosive shells.

1404. Edward Alfred Cowper, of Great George-street, Westminster. Improvements in furnaces for heating air and other elastic fluids.

1406. John Hope, of Bishops Auckland, Durham, engineer. An improved screw nut and ratchet brace for working the same.

1408. Jacob Ulrich Ott, of Zell, Switzerland,

machinist, and Friedrich August Moritz Udloff, of Somers Town, Middlesex, printer. Improvements in ruling paper, and in the pens or instruments for the same.

1410. Maria Bounsall Rowland, of Acton Green, Middlesex, widow. Improvements in soap and detergent preparations or compounds.

Dated May 20, 1857.

1412. Charles Weightman Harrison, of Woolwich, civil engineer. Improvements in obtaining light by electricity.

1414. Abel Foulkes, of Chester, glove manufacturer. Improvements in sewing or pointing gloves, and in machinery for such purposes.

1416. Alfred Austin Usher, of Birmingham, ironmonger. A new or improved moderator lamp.

1420. Laurent Lethuillier, of Rue Marbeuf, Paris, engineer. An improved machine for moulding and compressing bricks, tiles, and other articles made of soft materials.

1422. John Harrison, of New Church-road, South Hackney. Improvements in railway signals.

1424. Joseph Jakens, of Bury, Lancaster, manufacturing chemist. Improvements applicable to printing and dyeing woven fabrics and fibrous materials.

1426. William Stettinius Clark, of High Holborn. Improvements in machines for cleaning and polishing knives. A communication from J. Wilcox, of Philadelphia, U. S.

1428. Edward Curtis Kemp, of Avon-place, Birmingham, agent. Improvements in chandelier or other pendent gas lights, and in the fittings for the same.

Dated May 21, 1857.

1430. James Hopkins, of St. George's-in-the-East, schoolmaster, and George Pearce, of Mile End, scalebeam maker. Improvements in trucks.

1432. William Owen, of Ardwick, near Manchester, stretcher. Improvements in machinery or apparatus for stretching woven fabrics.

1434. William Todd, of Heywood, Lancaster, cotton spinner. Certain improvements in the treatment of yarns or threads, and in the apparatus for performing the same.

1436. William Beech, of Burslem, Stafford, manufacturer. Improvements in generating and applying motive power.

Dated May 22, 1857.

1440. Meyer Drukker, of London Wall, Swiss clock manufacturer. Improvements in apparatus for indicating the passage of time.

1446. John Turner Wright, of Birmingham, manufacturer, and Edwin Payton Wright, of Birmingham aforesaid, manufacturer. A new or improved manufacture of cloths or coverings for railway trucks and other vehicles, ricks, and other such like purposes.

1448. Benjamin Hornbuckle Hine, of Nottingham, manufacturer, and William Onion, of the same place, mechanic. Improvements in knitting machinery for the manufacture of ribbed fabrics.

1450. Samuel Fox, of Deepcar Works, Sheffield. An improvement in the manufacture of flat steel wire, used for the manufacture of the ribs and stretchers of umbrellas and parasols.

1452. Anton de Schuttenbach, of St. Petersburg. Improvements in preparing fatty matters for the manufacture of candles and other purposes.

Dated May 23, 1857.

1454. Noel Joseph Hyppolite Duplais, of Rue de l'Echiquier, Paris. Certain improvements in the manufacture of felt hats and bonnets.

1456. Edwin Travis, of Oldham, Lancaster, and Joseph Louis Casartelli, of Manchester. An improved apparatus for regulating the supply and discharge of steam, air, water, and other fluids.

1458. Thomas Humphrey Roberts, of Plymouth. Machinery or apparatus for cleaning the inside of casks and puncheons.

1460. Gautier Olivier de la Barre, of Great Titchfield-street, Cavendish-square. Improvements in obtaining and applying motive power. A communication.

Dated May 25, 1857.

1472. Henry Whatley Tyler, of Norfolk-crescent, Hyde-park, captain Royal Engineers. Improvements in the permanent way of railways.

1474. Richard Archibald Brooman, of 166, Fleet-street, London, E. C., patent agent. Improvements in pumps. A communication.

1476. John Earnshaw, jun., of Ossett, York, mechanic. Improvements in the toothed coverings of rag machine cylinders, and in the machinery or apparatus for preparing the same.

1478. William Scott Underhill, of Newport, manufacturer. Certain improvements in wringing machines.

1480. Robert James Hendrie, jun., of Blossom-street, Norton-Folgate, silk dyer. An improvement in steam boiler and other furnaces.

Dated May 27, 1857.

1483. Charles David Davies, of Holloway, machinist. Improvements in the application of coir or cocoa-nut tree fibre as a substitute for hair in the manufacture of cloths used in seed-crushing.

Dated June 9, 1857.

1605. William Wright, of Forth-street, Newcastle-on-Tyne, glass manufacturer. Improvements in apparatus for annealing glass in ovens.

1607. John Robertson, of Valley field, Mid-Lothian, N. B., engineer. Improvements in machinery or apparatus for treating or preparing and boiling rags and other materials.

1609. Joseph Henry Tuck, of Pall-mall, gentleman. Improvements in the application of light to facilitate operations under water.

1611. Peter Armand Lecomte de Fontainemoreau, of Rue de l'Echiquier, Paris. Improvements in the construction of axle bearings. A communication.

1613. Richard Archibald Brooman, of 166, Fleet-street, London, E. C., patent agent. Improvements in furnaces. A communication from F. H. Morel.

1615. William Edward Newton, of Chancery-lane, civil engineer. An improved life boat. A communication.

1619. Joseph Augustus Burdon, of Rue de l'Echiquier, Paris. Certain improvements in apparatus for producing expansion in steam and other motive power engines.

1621. Thomas Daniel, of Darley Mills, Derby. Improvements in drawing frames.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," June 30th,* 1857.)

464. H. Barber. Improvements in knitting-machinery.

472. J. Green. Improvements in furnaces for burning combustible gases under pressure, in the manufacture of glass, iron, and other metals.

476. J. Blanc. Improvements in making bread and biscuits. A communication.

479. D. Cheetham. Improvements in machinery or apparatus for preparing, spinning, and reeling cotton and other fibrous materials.

481. L. L. Foucher. Improvements in apparatus for the manufacture of type and other articles used in letter-press printing.

495. E. Edwards. Improvements in the manufacture of chains for cables and other purposes.

500. F. C. Jeune. An improved manufacture of artificial leather.

511. J. Barber. Improvements in compound printing maundrills.

513. J. Turner. Improvements in the process of manufacturing bread, and in the component parts of the same.

516. M. Grouse. An improved apparatus for giving stability to life-boats and other boats.

526. G. Devincenzi. Improvements in producing figures and designs upon plates for printing from.

543. J. H. Johnson. Improvements in fastenings for dress and other purposes. A communication.

549. J. Fenton. An improved method of connecting the feed pipes of locomotive engines and tenders.

556. J. H. Johnson. Improvements in carding-machines. A communication.

566. C. Bruton, sen., C. Bruton, jun., F. J. Bruton, and S. R. Bruton. An improved azure blue for domestic purposes.

570. V. Cassaignes. Improvements in the manufacture of metallic pens and penholders.

575. W. Robertson, J. G. Orchar, and J. Menzies. Improvements in machinery or apparatus for winding yarns or thread.

577. E. Mucklow. Certain improvements in apparatus to be employed for the purposes of cooling and evaporating.

622. E. Lindner. Improvements in cartridges and bullets, together with an apparatus for producing the same.

626. W. E. Newton. A preparation of materials for coating roofs or other portions of buildings, to render them impervious to wet. A communication.

642. J. L. F. Bardin. A new mode of ornamentation.

711. J. J. Derriey. Improvements in machines for manufacturing lozenges, wafers, or pastilles of pasty materials.

730. J. P. Oates. Improvements in machinery for the manufacture of bricks, tiles, pipes, and other articles made of plastic materials.

847. D. Tomasini. Improvements in the construction of easy chairs and chamber commodes.

996. E. Brooks. Improvements in the manufacture of fire-arms.

1078. T. L. Scowen. The horizontal fin-expanding canopy for carriages, boats, and places.

1200. D. Chadwick and H. Frost. Improvements in apparatus for measuring water and other liquids and gas, applicable also to the purpose of obtaining motive power.

1213. H. Ball. Improvements in repeating and other fire-arms.

1272. H. E. Hoole. Improvements in stove-grates.

1286. P. A. Lecomte de Fontainemoreau. Improvements in the preservation of grain and alimentary substances in general. A communication.

1360. W. Ashby. Improvements in water-wheels.

1366. J. Sharrocks. Improvements in machinery or apparatus for pressing bricks, tiles, and other plastic substances.

1404. E. A. Cowper. Improvements in furnaces for heating air and other elastic fluids.

1428. E. C. Kemp. Improvements in chandelier or other pendent gas-lights, and in the fittings for the same.

1446. J. T. Wright and E. P. Wright. A new or improved manufacture of cloths or coverings for railway trucks and other vehicles, ricks, and other such like purposes.

1448. B. H. Hine and W. Onion. Improvements in knitting-machinery for the manufacture of ribbed fabrics.

1527. M. Clark, H. Oldfield, and W. Salmon. Improvements in machinery or apparatus used in the manufacture of paper.

1572. W. Miller. Improvements in the manufacture of sugar, and in the apparatus used therein.

1602. J. Brown. Certain improvements adapted to the prevention of steam-boiler explosions.

1603. E. Brooks. A new or improved manufacture of gun-barrels and other articles of like manufacture.

1658. T. Turner. Improvements in apparatus to be employed as an alarm and detector in cases of burglary.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1401. Reuben Bottomley, David, Schofield, and Henry Spencer.
1410. William Yates.
1425. Theophile Schlœsing.
1429. Thomas Markland.
1431. Edward Joseph Hughes.
1467. Thomas Elliott.
1500. Henry Richard Cottam.

LIST OF SEALED PATENTS.

Sealed June 26, 1857.

3067. Frederick William Campin.
3076. George White.
3083. John Cheesman Wagstaff.
3085. Joseph Morel.
3087. Horace Vaughn.
3088. Joseph Henry George Wells.
8. Frederick Ayckbourn.
292. John Mayo Worrall.

Sealed June 30, 1857.

2895. William Stettinius Clark.
3053. Giuseppe Antonio Giovanni Nani.
1. John Talbot Pitman.
7. Frederick Herbert Maberly.
9. Frederic Sarley Stott.
11. William Henry Phillips.
25. James Harris.
28. Leonard William Watkins.
32. Richard Archibald Brooman.
52. Richard Archibald Brooman.
54. Matthew Trattles.
58. James Morris.
63. George Pate Cooper.
67. Edward Joseph Hughes.
68. James Harris.
76. John Rock Day.
79. John Henry Johnson.
85. Louis Julien Brethon.
94. William Watt.

122. George Parker and William Martin.
126. Francis Watkins.
144. Peter Walker.
154. John Haswell.
162. William Edward Newton.
172. John Henry Johnson.
185. Henry Cater.
452. Joseph Quick, junior, and Alexander [Fraser.
501. Joseph Glover and John Bold.
641. William Muir.
947. Emile Testelin.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Puckle and Kendrick, Birmingham; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburg.

Mechanics' Magazine.

No. 1770.] SATURDAY, JULY 11, 1857. [PRICE 3D

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street.

RIFLED ORDNANCE.

Fig. 1.

Fig. 2.

RIFLED ORDNANCE.

In a former number we noticed a work on "Rifled Ordnance," by an anonymous author, published by Clowes and Son, and dedicated to the Duke of Cambridge.* This work has subsequently reached a third edition, containing a large body of new matter, which adds much to its value. We propose to gather from the book in its new form a few suggestions, which appear to us to deserve attention, as the results of much reflection and numerous experiments on the part of the author.

The regulation of the turn of the grooves, whether for rifled ordnance or small arms, must depend, not only upon the description of projectiles employed, but also upon the nature of the service for which they are required. By giving to a shot a quick rotary movement about an axis situated in the direction of its flight, each portion of its surface is presented in turn to the same action of the air in such rapid succession that the latter has not time to act upon one part more than upon another, and its action upon the whole surface of the shot is thus equalized. The velocity of the rotation will, as the shot progresses, gradually be reduced by the resistance of the air; so that in an extended flight it will no longer answer its purpose. The only remedy for this, when the shot has to be fired at great elevations, is to increase the turn of the grooves. It would, therefore, be necessary to give a greater turn to the grooves of the description of ordnance required for this purpose, than to those which would (as with small arms) always be fired with less elevation. Undoubtedly, the greater the velocity of rotation given to the shot in either case, the more accurate would be its flight; but, as great angular velocity, when acquired by means of grooves in the bore of the gun, is attended with a loss of range, the least possible turn that can be efficiently used the better. Other inconveniences (such as the recoil, and liability of the shot to strip,) have likewise to be taken into consideration, and the length of the turn thus becomes a matter of great importance. It will be impossible to decide upon any standard for this turn, until the description of gun from which the projectile is to be fired, as well as the nature of the projectile itself, is known. These two being ascertained, it will then remain to find the length of turn which will best secure a proper degree of accuracy for the shot, with as little impediment as possible to its range and velocity of flight. For mortars, which are always fired at high elevations, the turn must necessarily be great, as it is indispensable that the shells projected from them should maintain their accuracy of flight to the full extent of their range. On account therefore of the greater turn than usual, a comparatively low initial velocity must be given to the shell, to prevent the danger of it stripping; for this reason, a shell of a longer or heavier description may be used with greater advantage with these than with any other kind of ordnance, less initial velocity being required for these shells than for others of less length. On the other hand, were it requisite to obtain the greatest possible range in a horizontal direction, or with lower elevations, a much less turn would suffice, but a shell of less length must be used, and a higher initial velocity given to it. In this manner, a greater range at the lower elevations may be obtained, and, for a certain distance, a proper degree of accuracy (the conditions of ordinary rifle firing, which is rarely practised at elevations exceeding 5° or 6°.) But, at greater elevations, the latter part of the shell's flight will not by any means be so accurate, nor will it in this case exceed the former in its random range, not only on account of the greater mean velocity of the longer shell, but for the reason that, when the turn is insufficient to keep a projectile steady throughout its whole flight, the plane of its resistance becomes greater in proportion as its flight becomes unsteady, and this not only causes deflection, but compels it to suffer a greater resistance from the air. The only advantage arising from the use of a slight turn, and a lighter description of shell, appear to be that, at the shorter ranges it could be used with less elevation, for the longer shell of the same diameter will not bear a charge of powder proportionate to its weight, even supposing the gun would stand it. It will, however, descend to the earth at a less angle, which is almost as great an advantage as that which would arise from the use of a lower elevation.

The above suggestions are stated by the author to show the widely different results produced by giving a shot its initial velocity of rotation by means of a great turn and low velocity, and by means of a high velocity and less turn. The former method is more applicable to heavy ordnance, and the latter to small arms. Care, however, should be taken that neither method be carried to too great an extreme in either arm; for in the one, the range itself would thereby be too much diminished, and in the other, the limit of the range at which a proper degree of accuracy would be attainable.

Having found, from experience, that great uncertainty and difference of opinion exist in

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* See *Mech. Mag.*, No. 1741, vol. lxv., p. 586.

respect to the rifling of ordnance, the author very judiciously says, "If at Shoeburyness, or elsewhere, the experiments with rifled guns, or the projectiles to be fired from them were (instead of being made for the purpose of trying certain shot or shells with a particular kind of gun only,) directed to the acquirement of the best description of shell for every different service, and the turn of the rifling best adapted to them *in order to procure a standard*, much more important and satisfactory data than are now obtained would be secured. For this purpose eight or ten guns of the same calibre might be rifled, each with a different turn; all experimental shells being made to fit that calibre, they might then be alternately fired from each gun. By these means the different effects produced would lead to satisfactory and conclusive results."

In the employment of artillery, to obtain the utmost effect with the greatest economy of time, labour, and expense, both in its construction and in its use, is a chief consideration. The engraving, fig. 1, on the front page of this number represents the description of gun with which this end may probably, in the author's judgment, be best attained. It may be called either a mortar or howitzer, as it could be used as either. It is 5 ft. 4 ins. in length, and of rather greater weight (120 cwt.) than a 10-inch solid shot gun; it has an 8-inch bore only, but will throw a shell of 250 lbs. weight, with a charge of 10 or 12 lbs. of powder. It might be employed equally as a siege gun, or for the deck of a ship or in gun boat. It is anticipated by the author that, as a mortar, besides an enormous increase in range, it would have the advantage in almost every other respect over the ordinary 13-inch mortar (the weight of which it would not much exceed,*) and could also be used with very great effect horizontally, as it would even then have a greater range than a 10-inch gun, and throw a shell of nearly three times its weight; and, although for short distances it might require a greater elevation than the 10-inch gun, yet, the mean velocity of the flight of such a projectile being so much greater, the mean elevations required for it would be less. It should have one whole turn in 17 feet (though probably one in 15 feet would be better,) in order to insure a perfectly steady flight throughout. With such a gun as this (when fired with the above-named charge of powder and projectile,) a range of 8,000 yards would probably be attainable.

The distribution of metal in this piece of ordnance, and the general construction of it, is said to be the result of some personal experience and a careful consultation of the different data procurable from practical and scientific sources; a slight addition to its length might, the author considers, be desirable (*see* dotted lines, fig. 1,) if bored for a 13-ins. mortar; but as this would increase the weight considerably with a bore 8-ins. in diameter only, it would be a question for military authorities, whether the advantages attending such an addition would compensate for the greater weight. Of course were the gun to be fired at elevations not exceeding 12° or 15°, a reduction in the thickness of the metal at the breech might be made, and its length could, therefore, be increased without materially increasing its weight. It will be seen, that the gun is elevated at the muzzle by means of a screw and roller, *a* and *b*, so that by shifting the quoin *c* at each degree of elevation, the gun is continually supported at three different points. The rest of the carriage is of similar construction to the ordinary gun-carriage used for the heavy deck guns of a ship. If thought preferable, or if the recoil should be considered too great for the foregoing arrangement, it might be mounted somewhat in the manner of a sea-service mortar. It is thought probable, however, that with this weight of gun and low charge (10 or 12 lbs.) of powder, the recoil would not be too much (with Fergusson's compressor) to allow of its being mounted as an ordinary deck gun.

This description of ordnance might be employed as a substitute both for sea-service mortars and shell guns, when the latter are used in gun boats, so that one description of vessel only would be necessary—the nature of the gun allowing of its being employed for either service, thus combining simplicity with great effect. The author thinks it would be very desirable to have all guns for elongated projectiles of an uniform character, and (with a view to the employment of the heaviest kind of shell possible,) of a description similar to the above; for whether it be for the destruction of men or of material, this description of shell would always, he considers, prove the most effective; and if they have the disadvantage of requiring a greater elevation, it is fully counter balanced, in their case, by the angle of the projectiles descent being less.

It appears altogether inexpedient to the author to use rifle guns for the broadside armament of ships or floating batteries; for, what with the delay caused in loading them, if iron shells are used, and the weight of metal required in the gun, for expanding shells, they could not be employed with greater general effect than those in ordinary use, especially

* Fig. 2, on the same page, shows the respective dimensions of the above gun, and those of a 13-inch sea-service mortar, the latter being indicated by dotted lines.

now that so much perfection seems to have been attained with Moorsom's percussion shells. The same objections would hold good with respect to siege guns for operations on land. For these, such a gun as we have described might prove very serviceable, as it could be used either as a mortar or howitzer, as circumstances might require, and would be much more effective for field service in every respect than another from which a lighter description of shell only could be fired.

"Of course," says the author, very properly, "before so great an alteration in artillery as this could take place, it would be necessary to submit its merits to the severest tests; but I feel assured they must result in the conviction, that it is the proper method for turning this description of projectile to the best account, and for simplifying its use."

It is an important feature in the use of the heavy shells that the length of the bore of the piece from which they are propelled may be considerably reduced; for the velocity which is necessary for them for ordinary purposes can be given with a bore seven or eight of their diameters in length only, and owing to their own great length, they acquire as true a flight as they would have if fired from a bore twelve or fourteen diameters long. This the author tried, by gradually reducing the length of an experimental gun from eighteen diameters of the bore to seven. The friction in their passage out of the gun is also much less when its length of bore is reduced. Their want of length, however, would quite preclude the possibility of these being used as broadside guns but on the deck of a large frigate one or more of them would prove a formidable addition to her armament. By the way, the author strongly confirms the view we took in our recent article upon the fighting qualities of the *Niagara* respecting the relative merits of shell guns and guns for firing solid shot. "If I may be allowed an opinion," he says, "I should say that shell guns—that is, such as cannot be used for solid shot as well, should be the exception, and not the rule, both on account of their less range and of the loss of time in loading them. No ship ought, I should imagine, to be armed entirely with them, unless they were of the heaviest kind possible, and she could command very great speed, and so choose her own distance for engaging the enemy."

The improved form of gun above described may also be employed on a smaller scale, as a field howitzer, to throw a shell of 32 lbs. weight. In this case it might be mounted on a carriage, with a jointed trail, by means of which the author proposes to increase the attainable elevation of the field-piece. On account of the reduced length of the bore, such a gun would be about the same weight as a 9-pounder brass gun, or 24-pounder howitzer. Should it be necessary to use grape shot with it, several plans might be devised for doing so without injuring the grooves, and probably even such as might render it advantageous to use such shot with rifled guns. (*To be continued.*)

SINGULAR ACOUSTIC EXPERIMENTS.

At the Royal Institution on Friday, June 5, 1857, Professor Tyndall gave an exceedingly interesting account of M. Lissajous' acoustic experiments. He first briefly noticed the physical cause of musical sound. The propagation of impulses through the atmosphere to the tympanum was illustrated by causing a brass rod to vibrate longitudinally: a disk was fixed to the end of the rod perpendicular to its length; and this disk, being held several feet above a surface of stretched paper on which sand was strewn, communicated its motion through the air to the paper, and produced a complex nodal figure of great beauty. Optical means had been resorted to by Dr. Young, and especially by Mr. Wheatstone, in the study of vibratory movements. M. Lissajous had extended and systematised the principle, and had exhibited his experiments before the Société d'Encouragement, and more recently before the Emperor of the French. When he became acquainted with the speaker's intention to introduce these experiments at the Royal Institution, he in the most obliging manner offered to come to London and make them himself. With him came M. Duboscq, who took charge of his own electric lamp, this being the source of light made use of on the occasion.

The experiments proceeded in the following order:

1. A sheaf of light was thrown from the lamp upon a mirror held in Prof. Tyndall's hand: on moving the mirror with sufficient speed the beam described a luminous ring upon the ceiling. The persistence of impressions upon the retina was thus illustrated.

2. A tuning fork had a pointed bit of copper foil attached to one of its prongs: the fork being caused to vibrate by a violin bow, the metallic point moved to and fro, and being caused to press gently upon a surface of glass coated with lamp black, the fork being held still, a fine line of a length equal to the amplitude of the vibrations, was described upon the glass; but when at the same time the whole fork was drawn

backwards with sufficient speed, a sinuous line was described upon the glass. The experiment was made by placing the coated glass before the lamp, having a lens in front of it, and bringing the surface of the glass to a focus on a distant screen. On drawing the fork over the surface in the manner described, the figure started forth with great beauty and precision. By causing a number of forks to pass at the same time over the coated glass, the relations of their vibrations were determined by merely counting the sinuosities. The octave, for example, had double the number of its fundamental note.

3. This was the first of the series of M. Lissajous' experiments. A tuning fork, with a metallic mirror attached to one of its prongs, was placed in front of the lamp: an intense beam of light was thrown on the mirror, and reflected back by the latter. This reflected beam was received on a small looking-glass, held in the hand of the experimenter, from which it was reflected back upon the screen. A lens being placed between the lamp and tuning fork, a sharply defined image of the orifice from which the light issued was obtained. When a violin bow was drawn across the fork, this image elongated itself to a line. By turning the mirror in the hand, the image upon the screen was resolved into a bright sinuous track, many feet in length.

4. A tuning fork was placed before the lamp, as in the last experiment; but instead of receiving the beam reflected from the mirror of the fork upon a looking-glass, it was received upon the mirror of a second fork, and reflected by the latter upon the screen. When one fork was excited by a bow, a straight line described itself upon the screen; when the other fork was subsequently excited, the figure described was that due to the combination of the vibrations of both the forks. This is the principle of the entire series of experiments now to be referred to..

When a single fork vibrates, the image which it casts upon the screen is elongated in a direction parallel to the prong of the fork. In order to have the vibrations rectangular one fork stood upright, the other was fixed horizontally in a vertical stand in the following experiments.

5. Two forks, in perfect unison with each other, were placed in the positions described, and caused to vibrate simultaneously. If both forks passed their position of equilibrium at the same instant, that is, if there was no difference of phase, the figure described was a straight line. When the difference of phase amounted to one-fourth, the figure was a circle: between these was an ellipse. The perfect unison of the two forks was proved by the immobility of the figure upon the screen. On loading one of them with a little weight, the figure no longer remained fixed, but passed from the straight line through the ellipse to a circle, thence back through the ellipse to the straight line. So slight is the departure from unison which may be thus rendered visible, that M. Lissajous states that it would be possible to make evident to a deaf person a discrepancy of one vibration in thirty thousand.

6. Two forks, one of which gave the octave of the other, were next made use of. When there was no difference of phase, the figure described upon the screen resembled an 8. If the unison was perfect, the figure, as in the former case, was fixed; but when the unison was disturbed, the figure passed through the changes corresponding to all possible differences of phase. The loops of the 8 became distorted, formed by superposition a single parabola, opened out again, became again symmetrical, and so on.

7. The fifth of the octave, the major third, and other combinations succeeded, the figures becoming more and more complex as the departure from simple relations between the vibrations increased.

8. Finally, two forks which, when sounded together, gave audible beats, were placed both upright upon the table. The beam reflected from the mirror of one was received upon that of the other, and reflected upon the screen. When both forks were sounded, they sometimes conspired to elongate the image; sometimes they opposed each other, and thus a series of elongations and shortenings addressed the eye at exactly the same intervals in which the beats addressed the ear.

At the conclusion of this beautiful series of experiments, which, thanks to the skill of those who performed them, were all successful, on the motion of Mr. Faraday, the thanks of the meeting were unanimously voted to MM. Lissajous and Duboscq, and communicated to those gentlemen by his Grace the President, the Duke of Northumberland.

DISCOVERY OF IRON IN ITALY.—"There is much talk of the discovery of iron," says an Italian correspondent of the *Athenæum*, "near the Lake Fucino, at Marzicanni. A concession for working the ground has been granted to that universal speculator, M. d'Agiout, and a French mining engineer, M. Messonier, has come down to survey it. Specimens of the ore, which had been examined, have been pronounced to be good. A quantity of lignite, too, has been found, and wood abounds in the neighbourhood, so that great facilities exist for carrying out the objects of the *concessionnaire*."

THE ELECTRIC CONDUCTIVITY OF COPPER WIRES.

Professor W. Thomson, in measuring the resistances of wires manufactured for submarine telegraphs, was surprised to find differences between different specimens so great as most materially to affect their value in the electrical operations for which they are designed. It seemed at first that the process of twisting into wire rope and covering with gutta percha must be looked to to find the explanation of these differences. After, however, a careful examination of copper wire strands, some covered, some uncovered, some varnished with india-rubber, and some oxydised by ignition in a hot flame, it was ascertained that none of these circumstances produced any sensible influence on the whole resistance, and that while there is some degree of constancy in the quality of wire supplied from the same manufactory, there is vast superiority in the produce of some manufactories over that of others. A submarine telegraph constructed with copper wire of one manufactory of only $\frac{1}{21}$ of an inch diameter, covered with gutta-percha to a diameter of a quarter of an inch, would with the same electrical power, and the same instruments, do more telegraphic work than one constructed with copper wire of another manufactory of $\frac{1}{18}$ of an inch diameter covered with gutta percha to a diameter of a third of an inch. What is the cause of these differences in electrical quality is a question of much practical importance and high scientific interest. The result of experiment shows that the greatest degree of brittleness producible by tension does not alter the conductivity of the metal by as much as one half per cent. A similar experiment showed no more sensible effect on the conductivity of copper wire to be produced by hammering it flat. There are no doubt slight effects on the conductivity of metals produced by every application, and by the altered condition left after the withdrawal of excessive stress; but these are found to be in all cases so minute that the present results as to copper wire are only what was to be expected.

South Kensington Museum. — The Committee of Council on Education have established a regulation by which any society for promoting science and art may have either the whole or any portions of the Museum, or the lecture theatre, lighted and open upon payment of a fee which covers the cost of the gas and the attendants.

THE "NIAGARA" AND HER CRITICS.

Those of our readers whose knowledge of periodical literature is at all extensive must have frequently met with statements to the effect that a Mr. John Clare, of Liverpool, was prepared to accomplish several very extraordinary feats in connection with the building of ships; to build, for example, ships that will neither sink, nor leak, nor yield to shot, and so on. A rather moderate letter from him obtained admission to our own pages a year or two since, but subsequently we have not availed ourselves of his favours. In other journals he has, however, managed to startle the public, one week by promising to carry thousands of them to America in an extremely short space of time, and the next by undertaking to disclose serious iniquities perpetrated by men in power.

Had Mr. John Clare confined himself to writing disrespectful letters to Lord Palmerston and the Lords of the Admiralty, and to receiving extremely brief and contemptuous replies from their secretaries, we should never, of course, have openly noticed his singularities; but as he has chosen to publish a very violent, though very stupid, attack upon us in a Liverpool paper, we think it may be well to expend a page, not in replying to him, but in letting our unscientific contemporaries know that when they insert his letters they give place to what is neither sensible nor civil.

As Mr. Clare's letter in the Liverpool paper would occupy two or three of our pages with intolerably bad English, we must content ourselves with giving an abstract of it, and quoting detached portions to suit our convenience. The letter is in form a criticism of our article upon the *Niagara*, published in our number for the 30th of May, and it comprises the following statements, of which those in inverted commas are copied *literally*. The statements are, that "the talented Steers" (the builder of the *Niagara*) is proved to have been a clever naval architect, "from the fact of his being in the employment of the New York Custom-house, *as ship measurer*, prior to his following the vocation of ship-builder;" that when Mr. Clare's eye "caught the elegant curves, blended longitudinally, vertically, and diagonally" of the *Niagara* from on board the ship, he felt in duty bound to state that she is the "nearest approach to perfection" that he had seen (which is a poor compliment certainly to the ship-builders of the Mersey); that the *Niagara* has eleven feet sheer; that the *Niagara* is "a fine bred blood-horse," and the British ships of war are "coarse

bred cart-horses;" that "some unprincipled person who does the touting, &c., for some of the 'Barnacles' of the 'Circumlocution Office' has been at work," because the *Mechanics' Magazine* says the *Niagara* is ugly, and in the *Times* all naval men are said to support the assertion; that Mr. Clare saw the Queen's yacht off Rock Ferry, and "could not see externally any great naval design;" that Sir Baldwin Walker sank many millions during the Russian war in useless craft; that the Surveyors of our navy are unfit for their positions; that the China war calls for some *large* vessels; that "there will be a pretty show-up ere long of the villany practised in the dockyards and arsenals, and the country roused to do justice to their sovereign;" and finally that Mr. John Clare "will go the round of England with loyalty on his head, justice in his right hand, and the begging-box in the left, delivering printed correspondence on the Russian mismanagement, and addressing the multitude!" We should not omit to add, that the letter further informs us that our article upon the *Niagara* was wrong in every point; and that in it some culpable person's ignorance was "hid behind the respectability of a first-rate journal." (We thank you for the compliment, Mr. Clare, and hope you will not regret having offered it.)

Now what is to be said of a man who is capable of writing such impertinent nonsense as all this, or of the journals which will consent in any way to sanction it? If there were nothing comic in it all, the whole matter would be undeserving of a single word.

Our main object in noticing the follies of this Mr. Clare is, however, to point out the kind of men who, under favourable circumstances, sometimes produce excitement in the public mind. For several years this very individual has occupied himself (almost exclusively, we should imagine), in an attempt to damage certain Government officers, and to push forward fanciful schemes of his own. Of course neither Lord Palmerston, nor Sir Charles Wood, nor Sir Baldwin Walker, nor Mr. Bernal Osborne, nor any other person possessing common sense, gives himself the least trouble about the letters of such a man; but this does not diminish the evil of conduct like his, one of the worst effects of which is that, when intelligent and serious persons bring forward just complaints against men in office, they get classed with such men as this Mr. Clare, and their remonstrances pass unheeded.

In his confused attack upon this Magazine, Mr. Clare intimates that we wrote the article upon the *Niagara* in the interest of the Government. Of course we do not require to defend ourselves from such an imputation, coming from such a person. Our own readers know perfectly well that, while we exhibit no antipathies against official persons merely because they are official persons, we, at the same time, have not a moment's hesitation in disclosing what we find to be injurious to the country, or wrong in principle, wherever we find it. But we cannot consent to sanction or further the objects of those weak-minded men who make Government and Government officers the everlasting targets of their childish archery. In a country like this, where the governing classes are powerful, it is sham patriotism to bring false charges against the servants of the state. In fact it is worse than sham patriotism; it is the greatest evil that men of genuine sense and spirit have to meet, and to it we shall certainly never lend ourselves. As little are we disposed to draw false and damaging contrasts between our countrymen and the Americans, although we ever desire to render full justice to the latter. When they sent the *Merrimac* here we gave her just praise; when the *Niagara* came we gave her just condemnation. So, at least, all think with whose opinions we have met, except Mr. John Clare, and an American journalist who sneers at our taste, and suggests that, "if the *Niagara* had a bow as bluff as a tub, and overhanging like the mountains in a Chinese picture," it would no doubt have excited our admiration.*

Before ending these remarks, we will judge Mr. John Clare by a few additional words out of his own mouth, in order to complete his condemnation. It will be remembered that, in speaking of the external appearance of the *Niagara*, we said: "On visiting her at Gravesend we approached her on the bow, and looked in vain for a single beauty of form about her. Her bow appeared to be one great plane, and her side another, the two breaking into each other with a harsh sudden curve, on which the light struck so sharply that it produced a positively painful impression." Our readers would perhaps like to know what rejoinder Mr. John Clare makes to this. He says: "Is not this twaddle? He admits sudden curves. If curves are inclines, when the light strikes them, the sooner that man is made a square, hexagon, or octagon of, the quicker will the mercantile marine retrograde to square built craft!" We added, "Besides this, the shade lies so deeply along her long flat side, that she seems actually to narrow in midships, where she should, of course, be broadest." Mr. John Clare considers that our point of view was

* *Scientific American.*

not a proper one; and recommends us, the next time we "write about naval architecture," to do as he did, that is, "*go aloft* and take a bird's eye view," and then we shall, he says, "see the curves plainly." If we wrote for the perusal of half-insane agitators, Mr. Clare's suggestion might be of service to us; but as we write for the public, who cannot very well get to the mast-head of every ship they see, we prefer our own mode of contemplation.

One further suggestion of Mr. Clare's is, that the names of the writers should be appended to our articles. This might be very gratifying to our personal ambition, but it would not be agreeable in all respects, and might certainly tend, in many instances, to unfaithfulness in contributors.

In what goes before we have dealt chiefly with Mr. Clare's letter on the *Niagara*, which is perhaps as absurd and ridiculous, and therefore as characteristic, as anything he has written. If we chose we could add what would be even less agreeable to him. But our end is, we apprehend, fully answered. These lines were written expressly to quench the little splenetic spark which he has been so long toiling to blow into a flame, and no journal of moderate repute will, we think, after the appearance of this article, assist him in his efforts.

PRICE'S CANDLE PATENT.

COURT OF QUEEN'S BENCH, GUILDHALL, JULY 3.

(*Sitting at Nisi Prius before Lord Campbell and a Special Jury.*)

PRICE'S PATENT CANDLE COMPANY *v.* BAUWEN'S PATENT CANDLE COMPANY.

Sir F. Thesiger, Mr. Grove, Q. C., Mr. M. Smith, Q.C., Mr. Lush, Q.C., and Mr. Webster appeared for the plaintiffs; Mr. H. Hill, Q.C., Mr. Hindmarch, and Mr. Standish, M.P., for the defendants.

The plaintiffs in this action were Price's Patent Candle Company, who have manufactories in London and Liverpool; and the defendants were Bauwen's Patent Candle Company, whose manufactory is in the Ranelagh-road, Pimlico. The action was brought to recover damages for the infringement of two patents, of which the plaintiffs are the proprietors, the former of which had been granted in 1842 to Messrs. Jones and Wilson, and the latter, in 1843, to Messrs. Gwynne and Wilson, for improvements in the treatment of oily and fatty matters and the manufacture of candles. The defendants denied the infringement, and also, in fact, the novelty of the inventions.

It appeared from the plaintiffs' evidence that the first of the above patents, "Jones and Wilson's," was granted on the 8th of Dec., 1842, and among other improvements it introduced a new mode of admitting steam into the still for the purpose of distilling the oily and fatty matters used in the manufacture, that is, admitting it "in minutely divided streams throughout the whole of the fatty or oily bodies under process, such streams being admitted below the surface of the fatty or oily bodies, and at or near the bottom of the still." The specification then added:—"We introduce such stream by perforated steam pipes in the form of a coil or otherwise, in like manner to what has heretofore been practised when boiling fatty and oily matters; but such mode of introducing steam in minutely divided streams has not been practised in combination with distillation."

The plaintiffs now used a descending pipe, which communicated with six tubes lying near the bottom of the still, from the perforated sides of which the steam escaped into the oily matter. It was alleged that the defendants had infringed this patent. They introduced the steam by means of a pipe terminating near the bottom of the still, with a disk concave on the under side; and the plaintiffs' witnesses stated that the stream descending through the tube would be spread over the under surface of the disk, and would ascend through the fatty or oily matter in the still in the form of a thin film, or, in the words of the plaintiffs' patent, "in minutely divided streams." It was therefore contended by the plaintiffs that the disk used by the defendants was merely a "mechanical equivalent" for the means adopted by the plaintiffs, and produced precisely the same results. The plaintiffs' second patent, "Gwynne and Wilson's," was dated the 28th of Dec., 1843, and among other improvements it described "a mode of distilling fatty and oily matters by causing such distillation to be effected by the heat of a suitable gaseous body (preferring steam)."

In the plaintiffs' process the heated steam was the only agency by which heat was applied to the oily matter, the fire under the still being altogether dispensed with. The plaintiffs complained that the defendants had adopted a process of distillation which was substantially the same as that patented in 1843, viz., by "superheated steam;" and in order to establish the case they called two witnesses, named Hastings and Murphy, who had been formerly in the defendants' employ, and who gave a description of the process which they adopted. According to their evidence, the defendants had a furnace at a distance from the still,

but communicating with it by a flue; and also a coil of steam pipes above the furnace, from which the steam entered the still. They stated that they had instructions to keep the coil of pipes at a red heat, the effect of which would be that the steam would become "superheated;" but that by the use of a damper in the flue, the heat of the steam could be kept down so that the manufacture might be conducted with "subheated steam." It appeared that two inspectors, Messrs. May and Perkins, had been appointed by the Court of Chancery to inspect the defendants' apparatus and its results. The inspectors' report, which was read in Court, showed that the results of the experiments, which were conducted entirely by the defendants' own workmen, were more successful when "subheated steam" was used (that is, steam at a temperature below that of the fatty matters) than when, by drawing out the damper, the "superheated steam" was employed.

Mr. Hill, Q.C. for the defendants, contended that there had been no infringement of the plaintiffs' patent. With respect to the first point, he contended that the steam was not introduced into the defendants' still "in minutely divided streams," but in one jet; and, secondly, that the process carried on by the defendants was by "subheated steam," and not by "superheated steam," as alleged by the plaintiffs.

Several scientific men of eminence were examined on behalf of the defendants, and stated their opinion that in the defendants' process the steam was not admitted into the oily matter "in minutely divided streams." They also stated that they had examined the defendants' apparatus, and had seen it used to distil by "subheated steam," and they considered the product so made was better than when the damper was drawn out and "superheated steam" was used. Mr. Bauwen, the manager of the defendants' company, and several of their workmen, distinctly contradicted the evidence given by Hastings and Murphy as to the mode in which defendants' manufacture was conducted, and evidence was given to show that the coil of steam pipes, which were ordinary iron gas pipes, would not have borne being kept at a red heat, as stated.

Mr. Hill, Q.C., and Sir F. Thesiger severally addressed the jury for their respective clients.

Lord Campbell, in summing up the evidence, said, the questions to be decided were entirely for the jury, and his Lordship thought, from the attention which they had paid to the evidence, they were fully competent to determine them. The first question was as to the novelty of the patent of 1842, which the defendants said was bad, because they had claimed one improvement, not now in dispute, which however was not new.

The jury expressed their opinion on this point in favour of the plaintiffs.

Lord Campbell said, there would, then, be two questions for their consideration,—whether the defendants had infringed either or both the patents of 1842 and 1843. The patent of 1842 related to the introduction of steam into the oily matter "in minutely divided streams," and the jury must say, upon the evidence, whether or not the method used by the defendants was substantially the same as that of the plaintiffs, and find their verdict accordingly. With respect to the patent of 1843, the jury would have a more difficult and painful question to determine. That patent referred to the use of what was called "superheated steam," instead of the previous method of using "subheated steam," in the process of distillation. On that point the evidence was of the most conflicting character, and therefore most proper to be determined by a jury, which in such cases was the best tribunal ever invented by the wit of man. If the plaintiffs' witnesses, Hastings and Murphy, spoke the truth, the defendants had supported their case by a system of conspiracy and perjury such as was never before witnessed; but their evidence was met by the direct evidence of Mr. Bauwen and his workmen, as well as by that of scientific witnesses.

The jury found a verdict for the plaintiffs as to the infringement of the patent of 1842, and for the defendants as to the patent of 1843.

As the patent of 1842 has already expired, the verdict is altogether favourable to Mr. Bauwen's Co., the operations of which are not consequently interfered with.

The Arctic Sea.—Commodore Rodgers, of the U. S. ship *Vincennes*, has communicated some interesting observations to the Secretary of the Navy at Washington, on the temperature and specific gravity of the Arctic Sea, at the surface, midway, and at the bottom. The results of his examination show, with remarkable uniformity, that the surface consists of warm and light water, cold water in the middle, and warm and heavy water at the bottom. These observations, which were made within Behring's Strait, tend greatly to confirm the theory of an open sea in the Arctic Ocean.

Nature Printing.—The King of Prussia has forwarded to Mr. Henry Bradbury the large Prussian gold medal, with an autograph letter, in acknowledgment of his efforts in the process of nature printing.

THE "SUSQUEHANNA."

(*From a Correspondent.*)

I this day sailed round the *Susquehanna* American steam frigate, now lying in Cowes Roads. The day was boisterous, so I contented myself with examining this fine vessel from the outside only. She is, indeed, a fine vessel, and altogether pleased me more than the *Merrimac* or *Niagara.* There is a serviceable look about her without any extreme extravagance of size, which is so remarkable in the *Niagara.* The *Susquehanna* is a paddle-wheel steamer, and is rigged as a barque. She is masted much on the principle of the American merchant ship, viz., with short lower masts, and very long pole, royal, and sky-sail masts, with square yards. Her lower rigging is set up with screws instead of lanyards. Her armament consists of twelve broadside guns and two pivot or slide guns. The bulwarks for using these two pivot guns are not made to fall down as on board of our ships, but are away altogether, and a tarpaulin is merely put up with stanchions to complete the break in the sheer of the bulwark, which would otherwise look very bad. I could not, of course, judge exactly what the weight of her metal was, but the broadside guns appear to be 10 inch. Her guns are all on the upper deck. She has two catheads on each side; the aftermost two are placed only a short distance before the sponsons. The spare anchors were not hanging from them, but were stowed on the fore part of the sponsons. Her paddle-wheels appeared to be of large diameter, and conveyed the impression that, if her engines are proportionally large, she must be a powerful vessel for steaming against a head wind. The upper parts of the paddle-boxes were fitted with boats on Captain Smith's plan. Very long upright wooden davits were rigged at each end for getting them out and in; these appeared very unsightly. The paddle floats are upon the old plan, that is, merely bolted to the radial arms without eccentric movement. If the *Susquehanna* had all her coals on board, together with her other weight, she is certainly a more buoyant vessel than any steamer we have in our service.

I must conclude by repeating that she struck me as being a very fine vessel of war of her class. To a certain extent the same fault may be found in her as in the *Niagara*, viz., that the size of the ship is too great for the number of guns which she carries. But this is not carried so far in her as in the *Niagara*, and, being a paddle-wheel steamer, it is not so remarkable. It being the anniversary of the American Independence, she was dressed with the American ensign at each mast-head, and fired a salute at noon.

Report on the Establishment and Present Condition of the Public Baths and Washhouses in Liverpool. By JAMES NEWLANDS, C.E., Borough Engineer. Liverpool: Hewson and Procter, printers.

THE Borough of Liverpool is fortunate in having a very intelligent and active engineer, of whose labours it very wisely avails itself to the fullest extent possible. The book before us, modestly called a Report, is really a very Comprehensive History of the Baths and Washhouses of Liverpool, illustrated by very elaborate and carefully executed general and detailed drawings. Mr. Newlands adds some remarks on the utility of such establishments, which are well worth attention. He states, from experience, that wash-houses are but little used by the poor, being mainly frequented by professional washerwomen and the servants of tradesmen and boarding-house or hotel keepers. The true remedy for the present defective working of public baths will, he believes, be found in the combination of fresh and salt-water baths in each establishment.

Brief Account of the Provisional Arrangement and Proposed Development of the Society of Arts' Collection of Illustrations of Every-day Life for the Working Classes. London: Printed by Charles Whiting, Beaufort House, Strand. 1857.

THIS is the First Part of a publication intended to explain the nature and objects of the Educational Collections of the South Kensington Museum, prepared by T. Twining, jun., Esq., in the name of the Council of the Society of Arts, as the Groundwork of a Proposed Museum of Domestic and Sanitary Economy, or Economic Museum. It consists chiefly of documents written by Mr. Twining, in illustration of the arrangements, and of examples setting forth the kind of instruction that is to be conveyed by means of the Museum.

PUBLIC DRINKING FOUNTAINS.—One of the most spirited and practical efforts ever made to increase our local sanitary appliances, has emanated from a private individual, Mr. C. P. Melly, of this town. Since March, 1854, Mr. Melly has erected, at his own cost, numerous drinking fountains in different parts of the town, which afford a constant supply of pure and refreshing water to the thirsty wayfarer. The first fountain was erected on the 31st of March, 1854, at the south end of Prince's Dock; it was of polished Aberdeen granite. Mr. McDonnell, of Aberdeen, offered to furnish polished granite fountains, according to Mr. Melly's design, at prime cost, without profit to himself; and we have the pleasure to announce that fourteen polished drinking fountains have been erected in the course of the year.—*Liverpool Year Book.*

THE BRIDGE IN ST. JAMES'S PARK.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In the *Builder* for 27th June, I noticed an admirable illustration of the new bridge of Messrs. Rendel across the ornamental water in St. James's Park, and in an article accompanying it, a description of the new bridge is followed by this remark: "It was intended originally," says your excellent contemporary, "to cross the lake by a viaduct; but this was objected to on the score of its obstructing too much the view along the lake, and a suspension bridge was finally agreed upon as the form of bridge least open to that objection."

On Sunday evening last, I strolled through the showers along the lake, and passed the bridge in question. On approaching it, and on looking back towards it after passing it, I was astonished to observe how seriously it interfered with the view of the lake. In fact, the entire body of the water beyond it was concealed from me during my walk along the greater portion of the distance between the bridge and the palace end of the water. As I am a man of moderate height, with my eyes about 5 feet 5 inches from the ground, I fear the great bulk of the foot passengers who seek refreshment at the lake side will experience the same disappointment as I. If so, I would recommend them to reflect, as I reflected, that although their gaze is obstructed, the eyes of their Sovereign and her estimable family, looking down from the southern apartments of the Palace, will be blessed with the complete view, and will find in the bridge nothing but another and a novel ornament. How fortunate are monarchs and courtiers, and how luckless we!

The obstructiveness of the bridge arises from the close lattice work of which its sides are formed. Had these sides been composed chiefly of rods formed and arranged with regard to the taste and pleasure of us plebeian pedestrians, I should have seen almost as much of the cool crystal beauty as the Queen. I suppose it is now too late to hope for such gratification.

Since Sunday I have again looked at the *Builder*, and find that if the artist had been far enough from the bridge to throw the water and not the opposite shore into the back ground of the picture, he would have perfectly illustrated my letter. But then the only thing visible beyond the bridge would (from the cause which I have explained) have been the Horse-guards and the Heavens.

As I write with perfect resignation, you will, I hope, give place to my reflections.

I am, Gentlemen, yours, &c.,

A LOVER OF LAKES.

ELONGATED RIFLE SHOT.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In a recent treatise on fire arms, by Lieutenant F. C. Simons, Bengal Artillery, page 25, is the following passage: "The projections upon a bullet are the rudders of it, and determine the direction of its head, and that too much after the manner that the hoisting or lowering particular sails of a ship is often made to determine the direction of its head." I do not think that the projections have this effect; their use is to hold firmly the grooves of the rifle, and not slip out of them, for if they do slip out of the grooves in passing through the barrel, the spiral motion round the long axis of the shot is not imparted to it. The following experiment proves this. In the year 1823, I was in the habit of discharging a rifled arrow or bolt, from Staudenmayer's rifled air-gun, and found that with elevation, I could throw it seven hundred yards. Its flight was perfectly steady, and the line of aim accurate. When I shot this same rifled bolt with its projections vertically, its flight upwards was perfectly steady, having the rotatory or spiral motion imparted to it; but when it began to descend, having no longer the spiral motion, it vibrated greatly. This, I think, proves that the spiral motion was altogether independent of the projections on its inner end. When I shot the same bolt from the smooth bore barrel of Staudenmayer's air gun, it barely reached the distance of four hundred yards, and vibrated during its whole flight. This rifled bolt is represented in page 7, fig. 15, in my pamphlet on projectiles. (Hebert, 88, Cheapside.)

I am, Gentlemen, yours, &c.,

J. NORTON.

June 30.

A NEW MODE OF PRESERVING CORPSES.—MM. Noualhier and Prévost, of Paris, have obtained a patent in this country for the following singular mode of preserving corpses. They first stop all the apertures, such as the mouth, nostrils, &c., with modellers' wax, then place the corpse in a suitable attitude, and spread over the skin a layer of metallic salt, by preference pulverised nitrate of silver, which is very easily applied. This salt penetrates into the pores of the skin, and when a sufficient quantity of it has been applied to the body by means of a brush, the body is put into a vessel of sulphate of copper, and a galvanic current being established the whole surface becomes covered with a deposit of copper, thus producing a metallic mummy.

THE NEW INDUCTION COILS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Mr. Bentley, in your last number, expresses a hope that I shall allow the discussion which has arisen between us, relative to my induction coil, to cease, and says that he should not have troubled you so much had it been a mere matter of priority, but he wishes to vindicate himself from an imputation of dishonesty. Mr. Bentley must recollect that he first threw down the gauntlet by coming forward in the *Philosophical Magazine*, in vindication of his friend, Dr. Noad, who, by the bye, is quite capable of taking his own part, at least in private, if not in public; and not contented with this, Mr. Bentley, in the same paper, endeavours to question my claim to priority by stating that his machine was finished six months before it was exhibited, and intimates that the one who first exhibits an improvement in public ought to have some share in the honour. Now, I submit that Mr. Bentley's own statements sufficiently decide the case in my favour. My machine was first exhibited in public at the Athenæum, Plymouth, by myself, in the early part of March, 1856, and by Dr. Noad, at the Plymouth Mechanics' Institute in the same month; and on the 17th Sept., 1856, I received the first silver medal from the Royal Cornwall Polytechnic Society for it, while Mr. Bentley's machine was not brought out by Dr. Noad until a fortnight after. So much for our appearance in public. Now, as to the time of first construction. Mine was finished about the middle of the year 1855; in November of that year I described its arrangement, and some of my experiments with it in a private letter to Mr. Grove, and showed it, together with some of the results of my investigations, to my friend, Dr. Letheby, at my own residence, in December, 1855.

In consequence of a threat contained in one of Dr. Noad's angry private letters to me, that he should endeavour to establish a priority in favour of Mr. Bentley, I have been rather more particular than I might perhaps otherwise have been, in noticing statements relative to the earliest construction of Mr. Bentley's machine, and the great discrepancies in these throw much doubt upon the matter. It is but fair to Mr. Bentley that I should point them out, and give him the opportunity of reconciling them if he can.

The first intelligence I received of Mr. Bentley's machine was from Dr. Noad, in a letter written in September, 1856, in which the machine was described, and from which I gathered that it had been very recently constructed. In consequence of my first paper in the *Philosophical Magazine*, November, 1856, reflecting on Dr. Noad's treatment of me, I received some very angry and uncourteous letters from him, one of which contained the threat before alluded to, and immediately afterwards, Mr. Bentley published an article in the *Philosophical Magazine*, a portion of which appeared in your last number, in which he stated that his machine was "the result of two years' experience."

At the conclusion of one of my lectures at the London Institution, I was introduced to a friend of Mr. Bentley's, Mr. Shuter, of Farringdon-street, who voluntarily told me that he was very intimate with Mr. Bentley, and that he, Mr. Bentley, did not attempt to improve the induction coil until June, 1856; that Mr. Bentley's present machine was commenced about that period, and finished in August; that he had had almost as much to do with its construction as Mr. Bentley, since all the different plans for carrying out the mode of insulation, &c., were concocted between them at his house; that Mr. Bentley had tried various thicknesses of gutta-percha, with different degrees of success, and at length on one occasion came running to him, Mr. Shuter, with breathless delight, telling him that he had actually produced a spark nearly two inches in length. These statements were made in the presence of my friend, Dr. Letheby, and with such an air of honest frankness, that I could not but credit them. Subsequently, however, finding that there was some inclination on the part of Mr. Bentley's friends to take precedence of me, I wrote on my return to Plymouth to Mr. Shuter, for further particulars. He replied that he would shortly give me the information which I required. After waiting some time, I again wrote to him and received the following answer:

(Copy.)

33, Farringdon-street,
Mr. Hearder. April 15, 1857.

Dear Sir,—I have much pleasure in being now able to give you the information you require respecting the "Induction Coil" made by my friend Bentley, and which I would have communicated earlier, only that I was desirous of giving you positive data. The said coil was commenced about Christmas, 1855, and finished in the month of June, 1856. It may, perhaps, be as well to tell you that, although the coil was not commenced until Christmas, 1855, he had made many coils upon a similar principle, and was more or less successful; and two years since he obtained an inch spark from a coil of about the same size. I have much pleasure in informing you, also, that he is now engaged upon a coil which bids fair to give very great and powerful results, as he is able to decompose water at the rate of 3 cubic inches per minute. Should you need any further particulars which I might be able to furnish you with, I shall only be too happy to do so.

I am, dear Sir,
Yours respectfully,
James L. Shuter.

This communication surprised me not a little, as it was strangely at variance with Mr. Shuter's former statements. Both accounts could not be true, and there appeared very little doubt that Mr. Bentley was quite aware of the contents of the letter. It appeared to me most extraordinary that Mr. Bentley should have made a machine to give a spark an inch long, at such an early period, and wait nearly two years to make it public. Mr. Bentley now, however, states that his machine was commenced in *January* and finished in *March*, 1856; and in his letter in the *Mechanics' Magazine*, No. 1767, makes no allusion to a machine constructed two years ago, to give a spark *an inch long*, but quotes a smaller one, made in 1855, which gave a spark *a third of an inch in length*. Lastly, Dr. Noad, in a recent letter to a friend of mine, of Plymouth, "begs to assure Mr. Hearder, that the arrangements of the induction coil by *Messrs. Bentley and Ladd*, were made entirely independently of his labours," and that Mr. Bentley's coil was in existence *before Dr. Noad's visit to Plymouth, in the early part of March*, 1856.

These are the discrepancies which I have not been able to harmonize. Messrs. Bentley, Noad, and Shuter evidently have not compared notes; and I think it will be allowed that they have, between them, involved the origin of Mr. Bentley's machine in very considerable doubt, and that he would have done much better to have been satisfied with the simple attempt to prove that his labours were independent of mine.

One word, however, upon this matter: Mr. Bentley points out what he calls an "*important difference*" between the construction of his machine and mine, namely, that I wind my wire close to the cheeks of the bobbin. This is a grand mistake; I do no such thing. The external coating of my machine has been mistaken for wire; it is not so; and if it were, it would be of no consequence, since I can prevent the passage of sparks under such circumstances, if Mr. Bentley cannot; and I again repeat that Mr. Bentley cannot point out a single essential feature of difference between

my machine and his. In conclusion, I would suggest to Mr. Bentley that when he details the results of the large machine which he says he is constructing, that he should apply accurate instruments of measurement, and not guess the length of spark by the eye, which is a very fallacious organ, as I fear was the case when he wrote the description of his instrument in the *Philosophical Magazine*, quoted in your last number; for on applying my micrometer discharger to his machine, when excited by a powerful battery, under very favourable circumstances, in the laboratory of the London Institution, I found the *measured length* of his longest spark to be one inch and six-tenths, instead of two inches, and with a quart Leyden jar, the spark was six-tenths of an inch, instead of an inch and a quarter. I could not with the powerful machine of my own, which I exhibited in my lectures at the London Institution, obtain sparks from the same jar even an inch long, although the machine, without the jar, was capable of giving sparks four measured inches in length, and was consequently nearly three times as strong as Mr. Bentley's. I suppose that after all, as far as the public are concerned, he will be considered to make the greatest improvement, who constructs the strongest machine for the least cost; and to this point my labours are at present tending, so as to bring it within the reach of all, and adapt it for telegraphic and other practical purposes; and I have already so far succeeded as to reduce the expense one half. I have now no objection whatever to allow the discussion to cease; and thanking you for your courtesy in admitting it to your columns,

I remain, Gentlemen, yours, &c.,

J. N. Hearder.

Plymouth, July 4, 1857.

MISCELLANEOUS INTELLIGENCE.

The First Brazilian Dry Dock.—The rising empire of Brazil, which is just now making numerous well-directed efforts to extend her maritime power among the nations, is at present completing its first dry dock at Rio de Janeiro. This dock is situated on Snake Island, near the dockyard. It is being excavated out of the solid rock, convicts having been employed for several years in roughing it out. Mr. Henry Law, an English engineer, has contrasted with the Brazilian Government to complete it for £75,000, including the cost of a 40-horse power engine to be employed in pumping the dock out, there being little or no tide in the harbour. The dimensions of the dock are—length, 300 feet; breadth, 92 feet; depth, 32 feet. The dock is so situated that its length may be increased to any desired extent.

Iron and Coal in Russia.—The piece of news that recurs most frequently in the Russian press is the discovery of extensive fields of coal and strata of iron. The last announcements of this kind are from the Crimea and the land of the Cossacks of the Don. In Kamisch Burun, in the neighbourhood of Kertch, there has been iron ore discovered, which yields 35 per cent. of iron, and is smelted by anthracite coal raised on the banks of the Don. In that district there is said to be an extensive coal-field, of about 2,000 square versts, the richest part of which is found in the neighbourhood of Alexandrovska (about 80 versts from Marioupol), where two strata, varying from 6 to 7 feet in thickness, are found at a depth of 16 and 20 fathoms from the surface. According to the calculations made on the spot, it is computed that a square verst there will produce 175,000,000 lbs. of coals. These productive coal-mines (as they are to be some day) are the property of Prince Lieven.

Treadwheel Punishment.—Dr. Edward Smith made, in October last, a series of experiments on himself at the Coldbath-fields Prison, for ascertaining the influence of the labour of the treadwheel over respiration and pulsation, and its relation to the waste of the system, and the dietary of the prisoners. He worked at the wheels during periods of a quarter of an hour each, with intervening periods of rest of a quarter of an hour, in the manner prescribed for the prisoners, and made seven series of observations. He found that during the exertion the quantity of air inspired was increased two-thirds over that inspired in standing at rest, the depth of inspiration two and a half times, and the rate of pulsation two and a half times. The returns during the period of rest show that the effects of the labour had not passed away in a quarter of an hour. He considers the effect of this exertion upon the system is, by the excessive exercise of the lungs and heart, to induce phthisis, asthma, emphysema, congestion of various organs, and disease of the heart; and in persons with diminished vital capacity of the lungs, and weak hearts, the effect must soon be very serious. He explains the mode of working the wheel—that the labour is not only in raising the body as the wheel descends, but in maintaining it erect in opposition to gravity, since the centre of gravity is probably external to and in front of the body. He shows that it is an uneven punishment—the inequality not being that of guilt, but of physical conformation and health—and hence that the punishment falls with different degrees of severity upon different classes of the community. He expresses his opinion that it is a punishment unfit for the aged, and certain, if long continued, to induce disease and a premature death.

The Sale of Poisons.—A very sensible little tract upon this subject has been published.* The following is a summary of

* "A Few Words about Poisons, chiefly with Reference to Present Difficulties. By a Pharmaceutist." London: H. Baillière, 219, Regent-street. 1857.

the author's practical suggestions. The poisons with which the public are familiar, either as medicine, or agents employed in the arts, are comparatively few in number, and, consequently, a list might be drawn up enumerating them, and these should be sold only in the presence of a witness of full age to whom the purchaser is known. This would be a sufficient guarantee for the legitimate application of the purchase. A second list might also be drawn up, comprising such poisons as are seldom or ever required by the public for medicinal or other purposes, and which, it is supposed, would be unsafe in non-professional hands. None of these should be sold on any pretence whatsoever, save as prescribed by a legally qualified medical practitioner, or through the agency of a certificate from such an authority. The Arsenic Act should not be repealed, nor should the foregoing provisions extend to the sale of poisons "in the ordinary course of wholesale dealing." The object of the *two* lists would be to prevent, as far as possible, an extension of the public familiarity with poisons, and, consequently, such only as are positively required for legitimate use should be subjected to the first-named restrictions. With regard to mistakes which occur in the dispensing of medicines, no better legislation can be provided than for the dispenser to keep all virulent poisons (distinctly labelled with their proper English names) in a closet set apart for the purpose; the word "poison" being in each case placed in a conspicuous position on the bottle, or other vessel containing such poison; this latter regulation may also apply to those poisons in daily use by the public. That the proposed plan is an imperfect one, as all such must be, is undoubted, but that it might be made effectual in checking those sad occurrences which too frequently come under our notice is confidently anticipated by the author.

THE COTTON TRADE.—Mr. Alderman J. Baynes, of Blackburn, has given two very interesting lectures on the cotton trade before the members of the Blackburn Literary, Scientific, and Mechanics' Institution. After alluding, at the conclusion of his second lecture, to the present anomalous position of the cotton trade, as an exception to the general law "that demand will create a supply," seeing that we are dependent for four-fifths of that supply upon one country, and upon a species of labour that is taxed to the utmost, and is diminishing, the lecturer said:—"An instrumentality is now formed which, if cordially supported by the public, will be potential in providing a remedy. It is an association which deserves the support alike of the cotton-spinner, the patriot, the philanthropist, and the Christian. I refer to the 'Cotton Supply Association,' inaugurated in Manchester, on Tuesday, the 21st April, 1857, and which owes its origin to a few patriotic gentlemen who are only indirectly interested in procuring a large supply of the article so greatly wanted. They are fine spinners, and draw the supply of their raw material from several sources, as Egypt, Brazil, and the Sea Islands of America. This association is essentially missionary in its character. Its objects are—To afford information to every country capable of producing cotton, both by the diffusion of printed directions for its cultivation, and sending competent teachers of cotton-planting and cleaning, and by direct communication with Christian missionaries, whose aid and co-operation it solicits; to supply, gratuitously, in the first instance, the best seeds to natives in every part of the world who are willing to receive them; to give prizes for the extended cultivation of cotton; and to lend gins and improved machines for cleaning and preparing cotton." For a full report of these important lectures we must refer our readers to supplements of the *Blackburn Standard*, in which they are reported at length.

THE INVENTION OF THE SCREW PROPELLER.—Captain Carpenter has again called attention, by means of a pamphlet,* to what he very naturally considers to be the unfair division of 20,000*l.* of public money among certain gentlemen, in consideration of the use made by the Admiralty of screw propellers in the Royal Navy. In our No. 1656, for May 5, 1856, we published Captain Carpenter's letter to Captain Scobell upon the subject, setting forth in detail the facts of the case. The new pamphlet contains Lord Lyndhurst's admirable speech to the same effect. There can be no doubt that of any ten unprejudiced men who should examine the matter, nine would decide without hesitation that Captain Carpenter has been grievously wronged, and that the case as it now stands, and as it has stood for years, is a permanent disgrace, both to the Admiralty who were unwise enough to occasion the injustice, and the Government which permits it to remain unremedied. If suitors for common justice were not frequently treated by official men as if they were suitors for alms, we should expect to see Captain Carpenter's claims speedily and honourably settled.

* "Statement showing how the Public Grant of £20,000 voted by Parliament as Compensation to the Inventor and Patentee of the Screw Propeller used in H. M. Service has been Applied; with Drawings and Diagrams." Blanchard and Sons, 62, Millbank-street, Westminster. 1857.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Sinclair, J. C. *Improvements in treating, preparing, and drying agricultural produce.* Dated Nov. 1, 1856. (No. 2569.)

This relates to the use of the centrifugal drying apparatus technically known as the hydro-extractor. In treating corn, for example, in this way the sheaves, as soon as they are reaped, are conveyed to the centrifugal apparatus, and the motion thereof throws off the moisture. The grain is deposited in the revolving chamber, so that the stubble ends are next to the outside of the arms, whilst the corn ends overlap each other so far in the middle as to keep the layers tolerably level, the damper samples being disposed at the parts nearest the extremities.

Cook, T. A. *Improvements in treating manganese ores.* Dated Nov. 1, 1856. (No. 2570.)

This consists in ridding manganese ores from foreign matters by subjecting them to the action of an acid. The ores are treated with an acid, either in a hot or cold state, of such strength that it dissolves the foreign matters, such as iron, &c., and does not affect the peroxide of manganese. Weak muriatic acid (say about 8° Twaddle), or sulphuric acid (say about 12° Twaddle), is suited to the purpose, but the residual product obtained in manufacturing chlorine from muriatic acid and peroxide of manganese is preferred.

Stone, J. *Improvements in the construction of force pumps.* Dated Nov. 1, 1856. (No. 2572.)

This relates to the manufacture of a force pump, whereby certain kinds of ships' pumps may be so constructed that they may also be used either as fire-engines or merely as bilge pumps when required, the valves, &c., being so arranged that they may be readily got at and repaired in case they should become clogged. These improvements are applicable to pumps of various constructions.

Curtis, W. J. *Improvements in lighting and ventilating railway carriages.* Dated Nov. 1, 1856. (No. 2574.)

To improve the ventilation of the carriage the lamp is caused to take its air from the interior of the carriage, and for this purpose a ring of wire gauze is introduced in connection with the glass globe, and in the roof of the carriage a box is opened to put the lamp into the opening through the roof, and it is then closed by a lid. From this box a tube runs along the roof of the carriage, and on the ends of the tubes are cowls which turn in the opposite direction to that in which the carriage is running, and thus a partial vacuum is produced on the box or case, and the ventilation of the carriage and the burning of the lamp are improved.

Tearne, S., and G. W. Richmond. *Certain improvements in producing ornamental designs on the surfaces of fancy and other goods made of papier maché, wood, glass, china, earthenware, tin, iron, or other such like materials, the surfaces of which, when made up, are usually finished by staining, varnishing, painting, or japanning.* Dated Nov. 3, 1856. (No. 2576.)

This consists—1. In producing designs upon surfaces by first colouring, graining, or marbling the said surface with a distemper or water colour, and transferring thereto a design printed in an oily material, so as to protect part of the surface while the graining or marbling is washed from the remainder. 2. Producing designs upon surfaces by first colouring, graining, or marbling the surface with an oil colour, and transferring thereto a design printed in distemper or water colour, so as to protect part of the surface, while the graining or marbling is removed from the remainder by a suitable solvent. 3. In a process of ornamenting pearl and such other surfaces as may be acted upon by acids. 4. In ornamenting glass by transferring thereto a printed design so as to defend portions of the surface while the stain or ground colour is poured or floated upon the said surface, and afterwards drying the stain or ground colour by burning. Lastly, ornamenting glass, &c., by transferring thereto designs printed in colours.

Nasmyth, J., and R. Wilson. *Improvements in hydraulic pumps and presses for packing cotton and other articles of the like nature.* Dated Nov. 3, 1856. (No. 2577.)

The first part of this invention consists in applying two or more cylinders and rams to such presses, whereby the pressure on the follower is distributed at two or more points, and the liability of breaking the follower is greatly reduced, and more pressure can be given. The second part consists in the application of a direct action reciprocating steam pump for working hydraulic presses. The third part in the application of two or more of the above direct action reciprocating pumps to work hydraulic presses. It also consists in the application of receivers for collecting water under pressure to be used as a reserve or direct supply for hydraulic presses employed in pressing cotton or other articles of the like nature.

Middleton, S. *Improvements in the manufacture of certain articles of leather with-*

out seams. Dated Nov. 3, 1856. (No. 2578.)

This consists—1. In exerting pressure upon casts or forms acting upon pieces of leather, and made to pass therewith through dies of metal, whereby a flat piece of leather is caused to assume the external shape of such lasts or forms. 2. In manufacturing certain articles out of the skins of the tails and other parts of certain animals, as, for example, sword scabbards, bayonet scabbards, whip-handles, and a variety of other articles.

WHITE, J. *Improvements in preparing for spinning cotton and other fibrous substances.* Dated Nov. 3, 1856. (No. 2579.)

The object here is to effect a greater uniformity in the size of the yarn as produced in the preparation of the same for spinning. The patentee applies weighting and indicating means, in connection with the carding engines and lap machines, in such manner that only a given quantity of the carded fibre will at any operation be taken by the cans or other receivers, by which the laps or other sheets or slivers continue of uniform length and weight.

CADET, E. N. *Improvements in the construction of cocks and taps.* Dated Nov. 3, 1856. (No. 2580.)

The various improvements comprised in the invention cannot be very well described without engravings.

SCOTT, E. E. *Improvements in stereoscopes.* Dated Nov. 3, 1856. (No. 2581.)

The patentee so arranges the double eye piece that the rays from the two pictures come to the eye as if they radiated from a point of medium distance, such as that at which we are in the habit of looking at natural objects. The effect being that the eyes of the observer instantly form the combined picture without the slightest pain to the eyes, and the reality of the view is more strongly impressed on the mind, and the pleasing illusion increased. This is done by using entire lenses, and placing their centres a little further apart than the distance betwixt the eyes of the observer, so that the rays from each picture are slightly refracted outwards.

WESTLY, W. K. *An improved method of, and machinery for, heckling, combing, drawing, and preparing fibrous substances for spinning.* Dated Nov. 3, 1856. (No. 2582.)

This is applicable as well to fibrous substances in a tangled condition, such as tow, &c., as to such as may be found in a straight condition, as flax, &c.. Tangled fibrous substances will require two machines; the first must be employed to open the fibres, and bring them parallel to each other, and the second to comb them. Fibres already straight will only require the second machine. Fibrous matters may be brought into a fit state for combing by carding and drawing, &c. The patentee claims particularly a gill card, with cylinders placed vertically or horizontally; also the application of a transferring blade movement, both for transferring and turning over stricks, and the ellipsograph movement; also certain holders, and a method of transferring the stricks from one holder to another, and the use and application of both a gridiron comb and a bell crank comb for heckling and drawing.

BESSEMER, H. *Improvements in the manufacture of rails, or railway bars and axles.* Dated Nov. 4, 1856. (No. 2585.)

The patentee claims—1st. The manufacture of rails or railway bars and railway axles, by uniting in one rail, bar, or axle, iron that has been rendered malleable by the process of puddling with steel obtained by the partial decarbonisation of crude or cast iron without the process of puddling, or recarbonisation by cementing. 2nd. Forming a rail, railway bar, or axle by uniting and rolling together iron that has been previously rolled with another portion of iron or steel, or semi-steel, in a cast and unrolled condition. 3rd. The manufacture of rails or railway bars or axles by uniting in one bar, rail, or axle a portion of iron that has been rendered malleable by the process of puddling with other portions of iron or with steel, or semi-steel, that has been rendered from crude or cast iron into a malleable metal, by means of currents of air or steam, and formed into an ingot or mass while in a fluid state. 4th. Uniting a solid bar of iron with another quantity of iron, steel, or semi-steel, in a fluid state for the purpose of forming railway bars or axles.

CAMPBELL, E. *A new and useful or improved apparatus for propelling a navigable vessel.* Dated Nov. 4, 1856. (No. 2586.)

This apparatus cannot be described without engravings.

GRAY, W. and J. TATE. *Improvements in apparatus for washing.* Dated Nov. 4, 1856. (No. 2587.)

In this invention a frame is employed in which the article to be washed is fixed, and this frame is by a suitable handle worked up and down in a tub between two sets of grooved rollers, one set on each side of the frame. The axes of the rollers are mounted at the two ends in inclined slots, and thus they press lightly by their own weight on both sides of the articles to be washed.

JESSOP, J. *Improvements in machinery for washing, wringing, and mangling.* Dated Nov. 4, 1856. (No. 2588.)

This machinery cannot be described without engravings.

COTTON, S. *An improved mode or method of regulating or governing lift, tilt, or other hammers worked by mechanical power.* Dated Nov. 4, 1856. (No. 2589.)

This relates to improvements in lift, tilt, or other hammers, worked by cams, eccentrics, tappets, friction or other arrangements, and consists in regulating the force of the blow by a piston working in an air cylinder, in conjunction with other arrangements.

NEWTON, W. E. *Improved machinery for riming and tapping gas fittings.* (A communication.) Dated Nov. 4, 1856. (No. 2590.)

This consists in the employment of a tool holder with bits or tools, and capable of being turned upon an axis in jaws upon the end of the revolving spindle which carries it, the axis of rotation of the tool holder being at right angles to the axis of revolution of the spindle, so that any one of the tools may be brought into line with the spindle, and made to revolve therewith. The inventor also makes use of a rotary chuck for holding the fittings.

MINHY, A. J. T. de M. DU. *Improvements in screw hand presses.* (A communication.) Dated Nov. 5, 1856. (No. 2592.)

These are made on the toggle joint principle. They are actuated by a right and left threaded screw gearing into double pivot nuts, or knees. The screw is driven by means of cog wheels or by cranks.

WEILD, W. *Improvements in velvet or cut pile fabrics, and in looms or machinery used for weaving such velvet and other loop pile fabrics.* Dated Nov. 5, 1856. (No. 2593.)

These relate to such as are intended for carpets, and consist in forming such fabrics with weft composed of two or more separate and distinct fine threads, in place of one single cross thread, that is, two or more threads are brought together and wound at the same time, as if one thread, on to one spool for the shuttle, so that each shoot of the shuttle gives off two or more separate and distinct threads as if one single thread.

URION, L. *Improvements in machinery for the manufacture of matches and match boxes.* Dated Nov. 5, 1856. (No. 2594.)

This cannot be described without engravings.

WILEY, W. E. *Improvements in pen holders.* Dated Nov. 5, 1856. (No. 2595.)

The patentee cuts a circular groove at the end of a piece of wood or other material. The most convenient mode of cutting it is to employ a rotary cutter. The end of the material to be cut is pressed up to the cutter. Or a pen holder may be made by means of two tubes of metal and a central core. The outer tube, in this case, is fixed to the end of the holder, such end being formed with a fixed core to lie within the upper end of the stem of a metal or other pen, around which core or centre a split metal tube is placed, its outer end being turned outwards so as to form a flanch.

TITTERTON, C. *Improvements in the manufacture of zinc and zinc white.* Dated Nov. 5, 1856. (No. 2596.)

This relates—1. To employing the refuse skimmings and dross obtained from various branches of manufacture where zinc is employed, and in using such matters (whose masses conglomerate) in the manufacture of zinc and zinc white. 2. When using oxides of zinc in the manufacture of white oxide of zinc, he uses two chambers, the one to receive the first products containing for the most part the oxide of cadmium, the other the white oxide of zinc. 3. The sieve or screen is to be constructed of wire gauze fixed in a frame, such frame being hung in a horizontal position with leather or other material, and to be elevated by a pulley to the required height, and then to strike against a stop effectually to shake the screen or sieve and detach the oxide therefrom. 4. In subjecting white zinc to great pressure when contained in a strong holder, the requisite pressure being obtained by hydraulic, screw, or other powerful presses acting on a ram or forcer fitting into the holder. 5. In rendering white oxide more dense, and at the same time to improve the colour by heating it in a clay retort or muffle to a moderate red heat, and afterwards quickly cooling it.

FERNIHOUGH, J. and R. FARROW. *A self-acting apparatus for regulating the supply of atmospheric air to furnaces, gas stoves, and other closed vessels used for the consumption of fuel or combustible gases by preventing the formation of smoke therefrom, and thereby economizing such fuel or combustible gases.* Dated Nov. 5, 1856. (No. 2597.)

This consists in admitting into and shutting off from any desired part of furnaces, flues, gas-stoves, &c., a supply of atmospheric air, by means of a series of valves or flaps, the opening and closing of which are caused by the external pressure of the air. The regulating force varies either more or less in proportion to the amount of burning fuel or gases, and the expanded products arising therefrom within the furnaces, flues, gas-stoves, or other vessels.

NEWTON, W. E. *Improvements in steam engines.* (A communication.) Dated Nov. 5, 1856. (No. 2598.)

Here the air-pump performs the function of the condenser by causing it to communicate direct with the steam cylinder. The steam passes from the cylinder direct into

the air-pump, where it is condensed by injecting into the air-pump, water, both above and below the piston.

CLISSOLD, W. *Improved apparatus for regulating the supply of water to water-wheels.* Dated Nov. 5, 1856. (No. 2599.)

This consists in adapting to the regulating gear of a water-wheel a clutch and cam, made to act upon the arms of a cog wheel mounted on a shaft placed at an angle to the toothed gear communicating with the shut-off apparatus. As the clutch pin and cam are moved to and fro laterally, the pin acts upon the regulating gear, and causes the wheels to rotate either part of a revolution, a whole one, or more than one, as the case may be.

KEELING, H. *An improvement in rivetting fish joints and other parts of the permanent way of railways.* Dated Nov. 5, 1856. (No. 2600.)

This consists in punching or drilling conical holes in fishing plates used for securing the ends of rails, and inserting in such holes rivets, which it is preferable to use cold. The rivets should be sufficiently long to project beyond the outside of the fishing plates, and by hammering upon the ends of the rivets until they are expanded into the conical holes the fishing plates become securely fixed to each other, and hold the rails tightly between them.

SEED, W., and W. RYDER. *Improvements in certain parts of machinery for slubbing and roving cotton and other fibrous materials.* Dated Nov. 5, 1856. (No. 2605.)

This relates—1. To improvements in Seed's patent centrifugal pressers, and consists in so shaping the counterbalance of the presser, that the centrifugal action produced by the flyer when revolving maintains a nearly uniform pressure of the presser during the accumulation of the slubbings or rovings on the spool or bobbin. 2. In forming the bearings to support pressers of iron, or other sheet metal bent to the required shape, and fixed to the flyer leg.

COLLIER, G. *Improvements in drying, stretching, and polishing or finishing yarns.* Dated Nov. 5, 1856. (No. 2609.)

These relate—1. To that class of machines used in finishing the yarn where the yarn in hank is supported, and has motion given to it by pairs of revolving rollers or cylinders, by which it is conducted against the surface of a heated chamber; and it consists in applying bushes to act upon such yarn for the purpose of laying the loose fibres all in one direction, combined with the use of rotating burnishers. 2. To treating yarns by a series of rotating brushes, each successive brush acting only to obtain a polish or lustre to the yarns.

STEVENS, G. H., and R. FITCH. *Improvements in locking and unlocking jars, bottles, and other vessels, and making such vessels air-tight.* Dated Nov. 6, 1856. (No. 2610.)

This consists in apparatus for locking and unlocking bottles, &c., and making such vessels secure and air-tight, and thus tend to prevent waste. It is especially applicable to bottles or vessels containing poison.

LA CABRA, J. *Improvements in the action of pianofortes.* Dated Nov. 6, 1856. (No. 2611.)

This has for its object—1. The simplifying of the action of pianofortes, and the bringing to bear of greater power than heretofore upon the hammers. 2. The arrangement of a check for arresting the hammers and preventing them from repeating upon the wires after every blow. The invention cannot be described in detail without engravings.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

KIRKHAM, J. *Improvements in the construction of furnaces, ovens, or kilns for drying, baking, or burning pottery, earthenware, bricks, tiles, or other similar articles, and in the means of collecting and condensing the smoke, gases, or vapours evolved from the fuel in such or other furnaces or fireplaces, or that escapes from the retorts and other parts of the apparatus used in the manufacture of gas.* Dated Nov. 3, 1856. (No. 2583.)

In carrying out the first part of the invention the furnace or oven should be built with brickwork, and the crown or top made close and air-tight, and the internal capacity constructed for the quantity of materials required to be burnt at one time; for which purpose one or more fire-places may be constructed in the bottom part of the oven, and air is admitted over the top of the fuel from the sides or ends of the furnaces, to assist the combustion of the gases evolved therefrom. The flame and heat circulate through the oven, and are then drawn down and through descending and horizontal flues constructed in the bottom of the oven, and thence are carried through a second or more ovens, whereby the spare heat may be beneficially employed in drying and preparing the articles or wares to be next burnt. The second part of the invention consists in exhausting from the flues of the furnaces, and collecting and condensing gases and vapours produced either by heat or distillation, or combustion of coals, coke, tar, &c., as well as the gases and vapours arising from decomposition or any other cause.

MURGATROYD, J. *Improvements in ma-*

chinery or apparatus for spinning, cleaning, doubling, and throwing silk, part of which improvements are applicable to machinery for roving and doubling cotton and other fibrous substances. Dated Nov. 4, 1856. (No. 2584.)

This consists—1. In a mode of communicating motion to the spindles and bobbins of machinery, whereby bands or belts are dispensed with. The spindles are driven by upright shafts put in motion by a horizontal shaft and bevel wheels; also in a mode of driving spindles and bobbins where upright intermediate shafts are employed, so as to increase the number of spindles in the frame without increasing the length thereof. 2. In the application of a drying apparatus to machines used in winding or spinning silk from the cocoon for drying the thread before it is wound on the bobbin or spindle. 3. In an apparatus for cleaning silk threads, consisting of an instrument having narrow openings through which the threads pass.

NEWTON, W. E. *Improved machinery for sweeping floors, streets, and walks.* (A communication.) Dated Nov. 4, 1856. (No. 2591.)

This consists in the combination with a rotating brush cylinder of a fan and a water vessel placed within the same casing which partly encloses the said cylinder, the fan being made to draw in by inhalation, and collect all the lighter portions of the dust which are taken up or thrown up by the action of the brush cylinder, and to deposit them in water.

HILL, H. *An improvement in locks for bags and other like articles.* Dated Nov. 5, 1856. (No. 2601.)

This consists in acting upon the bolts of bag locks, when only singly shot, by a stud connected to the bolt, and brought up at the top of the lock, or at right angles, or nearly so, with the lock spindle. A key must be used to double shoot the bolt, and bring it back to the single shoot.

BRINDLEY, W. *Improvements in the preparation of paper-hangings and other ornamental papers.* Dated Nov. 5, 1856. (No. 2602.)

These consist in rendering wall papers or paper hanging impervious to moisture by a peculiar process of oiling and drying, which has also the property of communicating to the water or body colours, with which the same are stained, much of the character of oil painting. And in glazing paper prepared by the said process, by passing the paper and compressing it between revolving smooth surfaced metal rollers, as practised in calendar machines.

SIEVIER, R. W. *An improvement in the mode of treating saccharine juices in the manufacture of sugar.* Dated Nov. 5, 1856. (No. 2603.)

To clarify the vegetable juices containing saccharine material, the inventor first expresses the juice from the vegetable (in any manner), and at the same time passes into it the fumes of sulphurous acid gas.

STANLEY, J. *Improvements in the construction of, and mode of applying, cranes and other machines to hoisting, suspending, and lowering purposes; also in generating, transmitting, and applying motive power to the same.* Dated Nov. 5, 1856. (No. 2604.)

The inventor constructs the boilers and engines upon the parts of such cranes that turn round the vertical axis, whereby he is able to bring such engines, &c., to act direct upon the hoisting gear without passing either steam or chain through the pivots or vertical axis. In the boilers he constructs the fire-box or other part of the boiler exposed to the heat of the furnace, corrugated, fluted, or receded, to increase the heating surface. The remaining portions of the invention cannot be described in detail without engravings.

HOLDWAY, F. *Improvements in the manufacture of candles.* Dated Nov. 6, 1856. (No. 2606.)

This consists in the making of candles with hollow wicks, and in having an opening through their entire lengths to allow a current of air to pass up or through the wick when burning.

BLACKWELL, W. *Improvements in ploughs.* Dated Nov. 5, 1856. (No. 2607.)

This consists in suspending by links beneath a carriage on wheels, one or more ploughs, so that they can be simultaneously lifted by a lever out of and clear of the earth, while removing the whole from one course of furrows to commence another. The whole is supported on wheels mounted in forks and capable of being swivelled partly round in any direction, by a lever fixed on the top of one of the forked supports for the wheels. All the wheels and forks are so connected together that, by moving a hand lever, they are made to turn simultaneously.

BROWNE, M. *Certain improvements in shirts.* Dated Nov. 5, 1856. (No. 2608.)

Each shirt may have more than one "front," "collar," and pair of wristbands. Where the shirt front (or wristband, &c.) is usually sewed in, the inventor leaves a space, at the two sides of which are to be stout edges with buttons attached. To fit in this vacant place he provides varied shirt fronts, with button holes for fastening to the edges aforesaid.

PROVISIONAL PROTECTIONS.

Dated April 22, 1857.

1126. James Sharples, of Crawshaw Booth, Lancaster, madder dyer. Improvements in drying cotton and other fibrous substances or materials.

Dated May 12, 1857.

1330. Peter Armand Lecomte de Fontainemoreau, of London. An improved hydraulic motor. A communication.

Dated May 25, 1857.

1462. Thomas Bullock, of Skinner-place, Holloway. The construction of water-closets upon the principle of self-action and self-cleansing, called the self-cleansing water-closet.

1464. William Robertson, of Glasgow, engineer. Improvements in pistons and in apparatus connected therewith.

1466. William Edward Newton, of Chancery-lane. Improved counting apparatus applicable for count ng envelopes cards, printed papers, or other articles that require to be put up in packets or parcels containing fixed numbers. A communication.

1468. Alphonse Coutant, of Paris, iron master. Improvements in forging and rolling iron wheels for railways.

1470. John Crossley, of St. Helen's, Lancashire, glass manufacturer. Improvements in machinery for grinding and smoothing glass, marble, and other substances.

Dated May 27, 1857.

1482. William Hart, of Brigg, Lincoln, lamp manufacturer. Improvements in signal-lamps.

1484. William Stettinius Clark, of High Holborn. Improvements in machines for producing artificial ices from cream and other liquids. A communication from G. W. Robinson and C. W. Lord, of Baltimore, U. S.

1486. William Stettinius Clark, of High Holborn. Improvements in copying-presses. A communication from W. M. Smith and P. Hannay, of Washington, U. S.

1488. James Sutcliffe, of Manchester, machinist. Improvements in water gauges.

1490. William Holland, of Birmingham, toolmaker. Improvements in umbrellas and parasols.

1492. Henry Crompton, of Farnworth, finisher. Certain improvements in machinery or apparatus for stretching woven fabrics.

1496. William Sawney, of Beverley, machinist. Improvements in winnowing or corn-dressing machines.

1498. Virginie Bacqueville-Pieters, of Paris. Improvements in outside blinds or shades for windows, doors, and other places.

1500. Randal Cresswell, of Conduit-street, Regent-street, merchant. Improvements in grease or lubricating-boxes for axles and other rotary parts of machinery.

1502. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent-agent. Improvements in distilling, and in apparatuses employed therein. A communication.

1504. Louis Joseph Almidor Danne, of Caen, France, gentleman. Manufacturing gutta percha glue, and applying the said glue to various new purposes.

1508. Edward Paige Griffiths, of High-street, Camberwell. Improvements in apparatus for beating the whites of eggs and other fluids and matters.

1510. William Hale, of Swan-walk, Chelsea. Improvements in rolling iron and steel.

1512. Alfred Vincent Newton, of Chancery-lane. Certain improved apparatus to be used in the manufacture of iron. A communication.

Dated May 28, 1857.

1514. Nathaniel Cox, of Liverpool, iron-merchant. Improvements in railways. A communication.

Dated May 29, 1857.

1516. William Wilber, of New York. Hot-air apparatus for hulling and extracting oils from oleaginous seeds.

1517. Thomas Willis and George Chell, both of Longsight, Manchester, machine-makers. Improvements in machinery for spinning, doubling, and winding yarn and thread.

1518. Charles Fleet, of Brighton. An improvement or improvements in the manufacture of printing-ink. A communication from G. Matthews, of Montreal.

1520. James Merrylees, of Paisley, manufacturer. Improvements in the manufacture or production of ornamental fabrics.

Dated May 30, 1857.

1524. William Stettinius Clark, of High Holborn. Improvements in machinery for the manufacture of an instrument for sharpening watch-cleaning sticks used by watchmakers, said instrument being also applicable to the sharpening of small wooden cylinders for other purposes, such as lead pencils, &c. A communication.

1526. Edouard Alexandre, of Paris. Improvements in the manufacture of organs and other similar musical instruments.

1528. Dr. Hermann Bleibtreu, of the Alum Works, near Bonn-on-the-Rhine, Prussia. A new mode of preparing coke for metallurgical processes.

1530. John James and William Daykin Grimshaw, of Southampton. An improved screw propeller for propelling ships or other navigable vessels through water.

1532. Jean Salles, of Paris, gunsmith. An improved safety-lock.

1534. George Watson Pye, lace-manufacturer, and Thomas Oldknow, machinist, both of Nottingham. Improvements in machinery for manufacturing bobbin-net or twist lace.

1536. Thomas Sherratt, of South-square, Gray's-inn, engraver. Improvements in time-keepers.

Dated June 1, 1857.

1540. William Henry Walenn, of Chancery-lane, consulting engineer. Improvements in the electric deposition of metals and metallic alloys.

1548. Richard Wright, of Brighton. Improvements in steam boilers.

Dated June 4, 1857.

1571. Cherie Martel, of Boulogne-sur-Mer, gunmaker. An improvement in fire-arms.

Dated June 5, 1857.

1588. James Morris, of Clapham, gentleman. Certain improvements in connecting the rails of railways, and in supporting the same.

Dated June 9, 1857.

1604. John Bickford, of Crediton, Devon. Improvements in machinery for cutting gutters for irrigating land, and for cutting other surface drains or gutters.

1606. William Wright, of Newcastle-on-Tyne, glass-manufacturer. Improvements in apparatus for feeding fires and furnaces with fuel.

1608. Isaac Whitesmith and William Whitesmith, of Glasgow, machinists. Improvements in weaving.

1610. Clement Auguste Kurtz and Louis Alcide Nori, of Pa:is, chemists. Improvemets in extracting the colouring matter from gum lac and other similar substances, and in treating the residues thereof.

1614. William Edward Newton, of Chancery-lane. An improved arrangement or construction of cut-off gear for steam engines. A communication.

1616. William Edward Newton, of Chancery-lane. An improved construction of faucet or cock. A communication.

1618. George Mumby, of Cloudesley-square, Islington, mechanical draughtsman. Improvements in machinery for sewing, embroidering, and other ornamental work.

1620. George Baxter, of Northampton-square, printer. Improvements in printing in colours.

Dated June 10, 1857.

1623. James Brown, of Aldgate, chemist. An improvement in the manufacture of paper.

1624. Joseph Sharp Bailey, of Keighley, York, wool-comber. Improvements in machinery for combing wool and other fibrous materials.

1625. Griffith Jarrett, of London, engraver. Improvements in apparatus for printing or endorsing in colours on paper or other surfaces, being improvements upon the invention secured to him by letters patent dated the 29th of July, 1853.

1626. Maxwell Miller, of Glasgow, brassfounder. Improvements in cocks, taps, or valves.

1627. William Gorse, of Birmingham, manufacturer, and Samuel Pollock, of Birmingham, machinist. New or improved machinery for the manufacture of bricks and other articles of like manufacture.

1628. Thomas Humphrey Roberts, of Stonehouse, Devon, brewer. Improvements in the manufacture of casks.

1629. George Sampson and Joseph Sampson, both of Bradford, stuff-finishers, and Elijah Ledger, of Lofthouse, bookkeeper. Improvements in means or apparatus for effecting the folding or rigging of woven fabrics.

1630. Arthur Dunn, of Dalston, fancy soap-manufacturer. An improvement in preparing and packing tooth-powder.

1631. Michael Puddefoot, of Queen's-terrace, Woolwich-road, chip and straw-manufacturer. Improvement in mowing-machines.

1632. Etienne Lemoine, of Paris, gas-fitter. Improvements in gas-meters.

1633. Alfred Vincent Newton, of Chancery-lane. Improvements in reaping-machines. A communication.

1634. Alfred Vincent Newton, of Chancery-lane. Improvements in the construction and mode of propelling and steering navigable vessels. A communication.

1635. William Edward Newton, of Chancery-lane, civil engineer. Improvements in printing-machinery. A communication.

Dated June 11, 1857.

1637. Arthur Folson, of Boston, United States, merchant. Improvements in the construction of tunnels or ways under water.

1638. Daniel Joseph Daly, of Tuckey-street, Cork, brewer. Improvements in venting casks, and in preserving them from bursting by the action of the liquors contained therein.

1639. James Robertson, of Glasgow, engineer. Improvements in lifting, lowering, transporting, and regulating the motion of heavy bodies.

1640. James Shaw and Hugh Shaw, both of Waterhead Mill, Oldham, spinners. Certain improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances.

1641. Josiah Latimer Clark, of Adelaide-road, Haverstock-hill. Improvements in apparatus for conveying letters or parcels between places by the pressure of air and vacuum.

1643. William Wilkins, of Leicester, overlooker. Improvements in machinery for the manufacture of looped fabrics.

Dated June 12, 1857.

1646. James Buchanan, of Glasgow, gentleman. Improvements in the manufacture and finishing of heddles or healds for weaving, parts of which improvements are applicable to the preparing and weaving of fibrous materials.

1647. Thomas Rutter, manufacturer, and James Banister, tube-maker, both of Birmingham. Improvements in umbrellas and parasols.

1649. George Davies, of Serle-street, Lincoln's-inn. Improved apparatus for weighing grain and other articles, to be called the electro-magnetic grain-scale. A communication from N. M. Phillips, of New York.

1650. Benjamin Noakes and Frederic John Wood, of Spa-road, metal cask-manufacturers. A method of, and apparatus to be employed in the sealing of the joints in metallic casks and other similar vessels.

1651. Edward Brasier, of Stepney, engineer. Improvements in treating flax, hemp, and other vegetable fibres, and in the machinery employed therein.

1652. Charles d'Ambly, of Stuttgart, Wurtemberg. Improvements in cutting and preparing horn. A communication.

1653. Carl Gustaf Carleman, of Jewin-crescent, London. Improvements in submerged propellers for propelling vessels.

1654. Malcolm Macdonald, of Glasgow, manufacturer. Improvements in washing, bleaching, cleansing, and preparing textile fabrics and materials.

1655. Eugène Barsanti, professor of physics, and Felix Matteucci, gentleman, both of Florence. Improved apparatus for obtaining motive power from gases.

1656. Clarance Brazil, of Chorley, Lancaster, manufacturer. Improvements in looms for weaving.

1657. George Lister, of Rivers, Gloucester, machinist. An improvement in carding-engines.

Dated June 13, 1857.

1660. Robert Mushet, of Coleford, Gloucester, metallurgist. Improvements in the manufacture of cast steel.

1662. Chapman March, of Alwalton Mills, Huntingdon, miller. Improvements in obtaining motive power.

1663. Etienne Cominal, of Paris, printer. Improvements in printing shawls and other tissues.

1664. Thomas Moreton Jones, of Cambridge-villas, Fulham, gentleman. Improvements in apparatus for cutting and gathering fruit and flowers.

1665. Alfred Vincent Newton, of Chancery-lane. An improvement in the manufacture of sulphuric acid. A communication.

1666. Helmuth Gartner, of Mount-gardens, Lambeth, engineer. An improved construction of engine for raising and discharging water.

Dated June 15, 1857.

1667. Thomas Heaton, of Bolton, engineer. Improvements in self-acting doors and gateways.

1668. Charles Vero and James Everitt, of Atherstone, Warwick, hat-manufacturers. Improvements in the manufacture of hats and other coverings for the head, and in machinery or apparatus to be employed in the said manufacture.

1669. John Henry Johnson, of Lincoln's-inn-fields. Improvements in quadrants, sextants, and other similar instruments. A communication from J. C. Lane, of Brooklyn, New York.

1671. William Edward Newton, of Chancery-lane. Improvements in puddling iron, and in the furnaces and apparatus employed for the purpose. A communication.

1672. Frederick Levick, junior, ironmaster, and

John James, furnace-manager, both of Cwm Celyn and Blaina Ironworks. An improved construction of hot-blast stove.

1673. Alfred Vincent Newton, of Chancery-lane. Improved means of registering the performance of railway trains. A communication.

1674. Edmund Thompson, of Barnard's-terrace, Scawby-with-Sturton, Lincoln, teacher of music. Improvements in pianoforte-hammers.

1675. William Young, of Queen-street, Cheapside. Improvements in lamps and burners.

Dated June 16, 1857.

1677. Thomas Wilkes Lord, of Leeds, consulting machinist. A certain improvement in machinery for carding flax, tow, and other fibrous substances.

1679. Stephen Holman, of Douglas-street, New Cross, engineer. Improvements in force-pumps.

1681. William Edward Newton, of Chancery-lane. An improved mode of, and apparatus for, feeding-in fuel to furnaces and fire-boxes. A communication.

1683. William Alexander Edwards, of Hereford-cottage, Denmark-road, Camberwell, engineer. Improvements in apparatus for separating iron and other matters from ores and other substances.

1685. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in the construction of wheels and axle-boxes. A communication.

1687. William Barnard de Blaquiere, of Pall-mall, commander of Her Majesty's ship "Alban." Improvements in connecting the ends of submarine electric telegraph cables.

Dated June 17, 1857.

1689. Philipp Kürten, of Cologne, Prussia, soap-manufacturer. An improved process of manufacturing mottled soap.

1695. Frederick Warner, of Jewin-crescent, Cripplegate. Improvements in supplying water to water-closets and other vessels.

1697 Henry Brinsmead, of Fore-street, St. Clement's, Ipswich. Improvements in machinery for dressing corn.

1699. Alfred Vincent Newton, of Chancery-lane, mechanical draughtsman. Improvements in machinery for forging nails and other articles. A communication.

Dated June 18, 1857.

1701. George Pemberton Clark, of Newark, New Jersey, U.S. An improved safety-valve for steam boilers.

1703. Thomas Ward, of Great Bridge, Stafford, roll-turner. An improvement or improvements in the manufacture of strip and hoop iron.

1705. William Joseph Thompson, of North Shields, Russian vice-consul. Improvements in machinery for preparing small coal and other matters to be used as fuel. A communication.

1707. George Washington Charlwood, of Tavistock-row, Covent-garden, London. Improvements in machines for mowing and reaping. A communication.

1709. Horace Hollister Day, of New York, india-rubber manufacturer. Improvements in the manufacture of elastic fabrics.

Dated June 19, 1857.

1711. James Champion, of Manchester, machine-maker. Improved arrangements of spindles and flyers, applicable to machinery or apparatus for preparing, spinning, and doubling fibrous materials.

1713. Thomas Spencer, analytical chemist, of Southampton-place, Euston-square. Certain improvements in the purification of water and other fluid and gaseous bodies.

1715. John Henry Johnson, of Lincoln's-inn-fields. Improvements in pressure-gauges. A communication.

1717. Horace Hollister Day, of New York, merchant. An improved method of treating or purifying gutta percha. A communication.

1719. William Edward Newton, of Chancery-lane. Improvements in the construction of railway crossings. A communication.

Dated June 20, 1857.

1721. Edward Kirk, ironmonger, James Leadbetter, brazier, and Charles Wilson, ironmonger, all of Leeds. Certain improvements in the manufacture of trunks, boxes, and other similar depositories.

1723. Edward Vincent Gardner, of Norfolk-street, Middlesex Hospital. Improvements in the means employed for burning fuel, and in the distribution of heat.

1725. Thomas Grahame, of Upper Seymour-street, Portman-square. Improvements in facilitating the passage of carriages on inclines of railways.

1727. Henry Dunington, of Nottingham. An improvement in the manufacture of cotton and silk and other warp pile fabrics.

1729. Edwin Clark, of Great George-street, Westminster, and Joseph Henry Tuck, of Pall-mall. Improvements in blocking or supporting ships and other vessels for the purpose of docking them.

1731. Lockington St Lawrence Bunn, of Walbrook, india-rubber merchant. Improvements in the manufacture of Wellington boots.

1733. Thomas Ford Caldicott, of Boston, America. Improvements in planes. A communication.

1735. William Edward Newton, of Chancery-lane. Certain improvements in looms for circular weaving, partly applicable to other purposes. A communication.

1737. Charles Fletcher, of Gloucester, mechanic. Improved machinery for making bricks, tiles, and other articles of clay or plastic materials.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

1795. John Bourne, of Billiter-street, civil engineer. An improved steam train for navigating shallow rivers. Dated June 26, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," July 7th,* 1857.)

522. C. A. Bourdier and V. Masselon. Improvements in obtaining and applying motive power.

527. J. E. Shearman. Improvements in saddles and collars for horses and other animals.

567. J. S. Edwards. The preparation and novel application of a certain foreign fruit or vegetable as an article of food, confectionery, or to be used in brewing or distilling, or for the manufacture of sugar and gum.

568. W. Mills. An improvement in the action of upright pianofortes.

569. B. Hodgson and J. Carter. Improvements in looms for weaving Brussels carpets and other terry fabrics.

581. S. Draper. Improvements in apparatus for retarding and stopping carriages on railways, and in cocks or taps used for such and other purposes.

585. E. Heale and M. A. Heale. The treatment of vegetable and other substances.

599. S. Wright. Improvements in gas-regulators.

603. W. Pedder. Certain improved methods of strengthening metallic and other structures.

607. F. W. Mowbray. Improvements in weaving.

636. W. E. Newton. Certain improvements in machines for cutting standing crops. A communication.

645. H. Greaves. Improvements in the mode of coupling or connecting pipes, columns, and conduits, in the machinery for manufacturing the hoops to be used in connecting such pipes and columns, and in the shape of such pipes, columns, and conduits, whereby they become adapted for the support and conveyance of vehicles.

652. W. E. Newton. An improved manufacture of tracing cloth. A communication.

659. L. Barton and E. S. Brookes. Improvements in the manufacture of knitted fabrics.

662. R. A. Brooman. Improvements in furnaces and fire-places. A communication.

672. R. A. Brooman. An improved method of and apparatus for maintaining the water level in boilers. A communication.

679. G. Davies. An improved self-inking stamp for printing cards, labels, and other articles. A communication.

680. J. A. Cumine. Improvements in electro-magnetic engines and batteries.

688. W. E. Newton. Certain improvements in steering-apparatus for ships and other vessels. A communication.

695. J. E. Duyck. An improvement in treating cotton seed, in order to extract colour from the oil obtained therefrom.

734. G. Marshall. An improved saw-setting apparatus.

737. H. Glaysher. Improvements in steam-engine boiler and other furnaces.

817. F. J. Jones. An improved buckle or fastening.

1258. J. T. Way. Improvements in obtaining light by electricity, and in employing light so obtained for lighthouses, and for giving signals.

1361. W. Hyde and J. Hyde. Improvements in the construction of vices.

1472. H. W. Tyler. Improvements in the permanent way of railways.

1481. J. E. Cook. An improved composition for the prevention of the decay and fouling of ships' bottoms and other exposed surfaces.

1510. W. Hale. Improvements in rolling iron and steel.

1520. J. Merrylees. Improvements in the manufacture or production of ornamental fabrics.

1523. L. Heinemann and A. Heinemann. Improvements in those parts of printing-machines called "doctors."

1528. H. Bleibtreu. A new mode of preparing coke for metallurgical processes.

1530. J. James and W. D. Grimshaw. An improved screw propeller for propelling ships or other navigable vessels through water.

1534. G. W. Pye. Improvements in machinery for manufacturing bobbin-net or twist lace.

1537. T. Wilson. Improvements in floating bodies used in washing-machines.

1571. C. Martel. An improvement in fire-arms.

1598. A. F. Sherman. Improvements in machinery for breaking, hatchelling, roving, spinning, and tarring hemp, flax, manilla, or any fibrous material or materials.

1623. J. Brown. An improvement in the manufacture of paper.

1625. G. Jarrett. Improvements in apparatus for printing or endorsing in colours on paper or other surfaces, being improvements upon the invention secured to him by letters patent dated the 29th day of July, 1853.

1635. W. E. Newton. Improvements in printing machinery. A communication.

1639. J. Robertson. Improvements in lifting, lowering, transporting, and regulating the motion of heavy bodies.

1643. W. Wilkins. Improvements in machinery for the manufacture of looped fabrics.

1646. J. Buchanan. Improvements in the manufacture and finishing of heddles or healds for weaving, parts of which improvements are applicable to the preparing and weaving of fibrous materials.

1650. B. Noakes and F. J. Wood. A method of and apparatus to be employed in the sealing of the joints in metallic casks and other similar vessels.

1654. M. Macdonald. Improvements in washing, bleaching, cleansing, and preparing textile fabrics and materials.

1662. C. March. Improvements in obtaining motive power.

1665. A. V. Newton. An improvement in the manufacture of sulphuric acid. A communication.

1671. W. E. Newton. Improvements in puddling iron, and in the furnaces and apparatus employed for the purpose. A communication.

1677. T. W. Lord. A certain improvement in machinery for carding flax, tow, and other fibrous substances.

1699. A. V. Newton. Improvements in machinery for forging nails and other articles. A communication.

1715. J. H. Johnson. Improvements in pressure gauges. A communication.

1727. H. Dunington. An improvement in the manufacture of cotton and silk and other warp pile fabrics.

1731. L. St. L. Bunn. Improvements in the manufacture of Wellington boots.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1464. Joseph Marie Bardet and François Collette.
1465. Richard Garrett, sen., and Richard Garrett, jun.
1469. David Bowlas.
1484. John Lamb.
1485. William Newzam Nicholson.
1489. James Edward McConnell.
1491. William Pole.
1628. Hughes Champonnois and Jean Baptiste Baveller.

LIST OF SEALED PATENTS.

Sealed July 3, 1857.

36. John Ingham, Edward Ingham, and Benjamin Ingham.
44. François Frédéric Dumarchey, Samuel Levy, and Joseph Mayer.
51. Charles Emilus Wright.
69. Alexander McDonald.
89. James Hodgson.
158. John Bird.
166. Victor Augustin Kientzy.
209. James Garth Marshall.
272. Samuel Montagu.
326. Alfred Vincent Newton.
343. George Wright.
346. Pierre Poisson.
574. David Davies.
657. Francis Alton Calvert.
781. Charles Weiss and Henry Lister.
795. George Perrott.
806. Edmund Hyde.
876. Joseph Scott.
930. Arthur Paget.
949. William Sumner.
960. Charles Burrell.
1032. Henry Adcock.
1105. Thomas Sanderson.

1110. Robert Tindall.
1125. Daniel Colladon.
1150. Rudolph Bodmer.
1174. William Cory, jun.
1175. The Rev. James Burrow.
1184. Peter Armand Lecomte de Fontainemoreau.
1219. William Edward Newton.
1245. John Marland.

Sealed July 7, 1857.

61. William Young Smith.
83. John Bagshaw and John Paine Harris.
84. John and Christopher Gratrix.
86. David Dunne Kyle.
90. Francis Xavier Kukla.
91. Charles Richard Olliffe and James Anning Gollop.
92. John Francis Porter.
95. Richard Archibald Brooman.
105. John Hinks and George Wells.
113. Robert Russell.
120. Alfred Charles Hobbs.
202. Abraham Hemingway and Thomas Wheatley.
244. Robert Harlow.
245. Charles Whowell.
312. James Taylor.
477. Thomas William Davenport and Samuel Cole.
544. George McCallan.
750. William Edward Newton.
763. John Wilkes, Thomas Wilkes, and Gilbert Wilkes.
1133. John Henry Johnson.
1273. Levi Bissell.
1284. William Edward Newton.
1340. John Richard Cochrane.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Puckle and Kendrick, Birmingham; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburg.

Mechanics' Magazine.

No. 1771.] SATURDAY, JULY 18, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street.

MORRISON'S STEAM PILE DRIVER.

Fig. 1.

Fig. 2.

MORRISON'S STEAM PILE DRIVER.*

THE time required for all large works in the vicinity of water is very much increased by the tedious process of pile-driving. When it is recollected that an ordinary pile-driving machine with four men will rarely drive more than one pile in a day and a half, the putting in of 1,000 piles by this means becomes a lengthy process, and costs in wages alone nearly £800. To reduce in some measure both the time and expense, it is customary to use a small steam engine, and to connect to it the chains running from a number of the old hand pile drivers; but here, although labour certainly is saved, yet the original machine remaining the same, no additional speed is attained.

Upon the commencement of the extensive dock works by the River Tyne Commissioners at Hay Hole, near Newcastle, contracted for by Mr. Thornbury, this difficulty was practically met by the introduction of a direct steam pile driver, designed by Mr. Morrison, of great power, capable of driving a 14-inch square pile 35 feet in 12 minutes in very difficult ground. In fact, since it has been in operation, the mere driving of the piles has been but a small item in the time; getting up the piles, pointing, and preparing to drive them, now cause the principal delay; and accordingly 21 piles per day are as much as the machine has usually driven. But from what can be done when piles are ready and quickly brought up, there is little doubt but that the machine could easily drive from 30 to 36 piles in 10 hours. The attendance required is very trifling; namely, one engineman, one stoker, and two assistants for pitching the piles; the amount of wages being thus the same as for one single hand machine, with the exception of a few shillings more given to the engineman, whilst the work done is more than 30 times as great, and upon ground on which no hand pile-driving machines could make any impression at a depth of more than 16 feet.

The new steam pile driver is shown in the accompanying engravings. Fig. 1 is a side elevation with the steam cylinder in section; and fig. 2 a front elevation. Fig. 3 is a vertical section of the steam cylinder on a larger scale.

The whole of the apparatus, auxiliary engine, boiler, and lifting tackle, is carried upon one moveable platform, A A A, on eight wheels, B B, the whole travelling as the work progresses along rails laid on the piles already driven; upon this framework are erected two strong uprights, C C, well and securely fitted together, and serving as guides to the hammer cylinders, D D. On the top of each of these uprights are two pulleys, E and F, the larger ones, E, for raising the cylinders and placing them on the top of the piles, G G, and the smaller ones, F, for raising and placing the piles themselves; the machinery and gearing for this purpose being driven by a small engine. The pile, G, is made round at the top and hooped, having a shoulder to receive the collar, H, fig. 3, to which are attached the four columns, I I, carrying the cylinder, D, of the driver or hammer. The piston rod, K, is made large, and forms the weight, and, being in one piece with the piston, is perfectly secure against all liability to breakage. The cylinder is guided by brackets which embrace iron plates attached to the uprights, C C. The steam is conveyed from the boiler to the slide-valve case, L, by a jointed steam pipe, M, which allows the cylinders to move up and down as the height of the piles may require.

When it is desired to put the machine in operation, the auxiliary engine, N, is connected by means of a clutch to the chain barrels, O, and the hammer cylinders, D D, are lifted to the top of the uprights by the chains, P, and are there held from moving by a break; the gearing is then disconnected from them by the clutch, and applied to the smaller barrel, R, on which is wound the chain, S. This chain passes over the smaller pulley, F, at the top of the uprights, C, and is attached to the pile, which is thus raised and placed in the position required for driving. This done, the cylinder, D, is lowered, so that the collar, H, fits on the rounded head of the pile, and rests upon the shoulder; the whole weight of the cylinder is then allowed to rest on the pile, while the strokes of the piston rod or hammer bar, K, cause the pile to descend, the chain, P, being then left slack, so as to allow the cylinder to descend with the pile as it is driven.

The apparatus for working the hammer bar is very simple, and consists of an ordinary slide valve in the box, L, fig. 3, the valve rod being connected to a volute spring, the pressure of which tends to hold the valve open, so as to admit the steam into the bottom of the cylinder to raise the hammer bar, K. The bottom of the hammer bar has a catch, which strikes the spanner, T, when the hammer rises, and draws the valve rod down, shutting off the steam from the cylinder, and allowing the steam that has just performed the up stroke to escape; at the same time a small catch, U, slips into a notch in the top of the valve rod, and holds the valve shut until the hammer has descended and struck the pile. The concussion of the blow causes the kicker, V, at the top of the hammer bar to release the catch,

* In the *Mechanics' Magazine* for Nov. 8, 1856, No. 1735, we gave a general description (which was copied into several American and other foreign papers) of Mr. Morrison's steam pile driver. The above illustrated description was prepared by the inventor, and read at the Institution of Mechanical Engineers.

U, and the pressure of the volute spring raises the valve, admitting the steam under the hammer ready for another stroke. The process is continued in this manner until the pile is driven deep enough. The auxiliary engine, N, is then put into gear with the wheels, W, by means of a clutch, and the whole machine is made to advance; the hammer cylinders are then lifted again, and another couple of piles are raised and placed; and so on till the work is completed.

n consequence of having separate gearing for raising piles and the cylinders, the piles can be raised up paratory to pitching, while those previously placed are ıg driven. Two or more such machines may be used ther, or one only employed; and the piles may be en either upright, or at an angle, by altering the up- ıt as circumstances may require. When at an angle, steam should be used on both sides of the pistons.

he auxiliary engine, N, is so arranged that the con- ting rod works through a flat elongated trunk, fixed to piston and passing through a stuffing box in the bot- of the cylinder; the piston has also a round trunk ecting through the top of the cylinder, which serves means of lubricating the end of the connecting rod, is made of such size that the effective area of the bot- side of the piston shall exceed the effective area of top side of the piston by such an amount as that the ht of the piston with trunks and connecting rod com- may be correctly balanced, taking into consideration pressure of steam intended to be used. The boiler, is of the vertical description, with a single conical ox, nearly equal in size at the bottom to the diameter e boiler, and at the top equal to the diameter of the ney. This boiler has been found to answer very well.

he advantages of the steam pile driving machine above ribed are, that the ram, piston, and rod, are made in solid piece 10½ inches in diameter, so that there is no ibility of breaking them; and being arranged to work ugh both ends of the cylinders, they require no other es; also the ends of the ram and pile are always ex- d to view, and can at any time be got at without ıg any of the parts to pieces. In the ordinary forms e machine, on the other hand, the ram is made of a square block of cast iron, secured to a small piston 2½ inches in diameter; this rod again has to be se- d to the piston in the cylinder; and a round face has keyed on the end of the square metal ram to drive pile, making in all three joints, all of which are a e of trouble by getting loose and breaking. The e metal block or ram has to be guided in a box or k, made of boiler plate and bolted together, so that the and gearing are hidden from view, as well as the end e pile; and when anything gets wrong, the whole has taken to pieces, before it can be seen and remedied. e blow from the new machine is much more effective that of a short hammer block of the same weight, as iston rod or ram is a bar 12 feet long weighing 35 let fall 3½ feet on end, instead of a bar 4 feet long he same weight, let fall the same height; the blow e long bar on end being found to be one half more ive.

stly, this machine drives two or more piles at the time. It has a clear fall of 3 feet 6 inches with a ıt of 35 cwt. It is carried upon the piles already n, and does not require two extra rows of temporary piles to be driven, in order to carry it, as in ordinary machines, which, when one pile is driven, require to be shifted sideways to drive the other, besides being shifted forwards.

NEWALL'S PATENT FOR MAKING WIRE ROPE.

(Sittings at Nisi Prius, at Guildhall, before Mr. Justice Wightman and a Special Jury.)

NEWALL *v.* WEBSTER.

Sir F. Thesiger, Mr. M. Smith, Mr. Webster, and Mr. Cleasby, were counsel for the plaintiff; and Mr. Bovill, Mr. Wordsworth, and Mr. Unthank for the defendants.

The plaintiff carried on the business of a manufacturer of wire rope in the Strand and other parts of the kingdom, under a patent which expired in August, 1854. The defendants were ropemakers at Sunderland. The plaintiff in 1840 applied for this patent for manufacturing untwisted wire rope. At the time of the application a person named Kupar had a similar invention, and Newall and Kupar came to an arrangement so that the patent might be taken out, and it was agreed that the plaintiff should have his patent for general use, and that Kupar should have a ropewalk merely, and they were mutually to defend the patent if it should be attacked. The defendants, finding the wire rope superseding the common hemp rope, endeavoured to see whether they could not entitle themselves to some of the profits, and they applied their machinery to the making of wire rope. Proceedings were then adopted against the defendants, an injunction was granted, and an action was brought, which was tried in 1845. The result was a verdict for the plaintiff, establishing the patent, and proving the infringement by the defendants. The defendants then applied for a new trial, raising various nice points of law. The plaintiff then entered into an arrangement with the defendants, and it was agreed that the plaintiff should grant an exclusive right to the defendants to use the patent, they paying a royalty of £5 10*s.* per ton for round rope, and £7 per ton for flat rope, and they stipulated that they would not sell below a certain price; there was a covenant on the part of the plaintiff that he would not grant a licence to any other person, and a stipulation that, in case of any verdict being given deciding that the patent should be void, the royalty was to cease and be no longer payable, but that up to that time the royalty should be paid. The defendant was to pay one-third of the costs of defending any proceedings. From 1845 to August, 1854, large profits were made by the defendants, but it was then discovered that a person named Wilkins had been infringing the patent, and proceedings were adopted against him, and the validity of the patent was established. In 1852, it was discovered that Wilson was infringing the patent, and proceedings were instituted against him, but he brought forward in his defence, a publication of one Albert, a German, published in this country prior to the date of the plaintiff's patent, in which there was a passage which indicated that Albert was of opinion that it was important that rope should be made with wire untwisted, and so far he had anticipated the plaintiff's invention. An action was brought in the Queen's Bench, which stood for trial on the 5th of July, 1852. This was the period of a general election, and many of the leading counsel were absent from London, and there was great difficulty in preparing counsel before the day of the trial. On the 5th of July, all the parties appeared in court, ready for the trial. The jury were sworn, when the counsel for the plaintiff, being very ill-prepared to enter into the consideration of the exact bearing of Albert's publication, suggested the propriety of entering into a negotiation for the purpose of arranging the matter, in order to prevent a trial. All the parties, yielding to the suggestions of their counsel, permitted the negotiation to be entered into, and accordingly counsel communicated together. The negotiation was brought to a conclusion, and the counsel signed an agreement that the plaintiff was to have a verdict, and was to give the defendant an unlimited licence except as to the price at which the article was to be sold; and that the bill was to be dismissed, the injunction to be dissolved, the plaintiff to pay the defendant's taxed costs. Those terms ultimately received the sanction of the clients, without any objection on the part of the present defendants, except as regarded Wilson's having the unlimited licence, and the payment of the costs, and they said that they ought to be placed on the same footing as Wilson in that respect; and there certainly was an impression on the mind of the attorney for the plaintiff that some modification should be made in the terms.

Ultimately Webster refused to enter into any arrangement, and now insisted that an agreement had been entered into with him, that he should be released from the payment of the royalty. The defendant also insisted that by the arrangement made with Wilson the patent was virtually defeated, and that he was discharged by the provisions in the deed of 1845 from the payment of any further royalty. The action was brought to recover upwards of 3,000*l.* for royalties.

The defence was that what took place on the 5th of July was a virtual defeat of the patent, and that the defendant was not a party to the agreement by which Wilson was given an unlimited licence; on the

contrary, he complained of what had been done.

The jury retired, but eventually returned a verdict for the plaintiff—damages 4,543*l.*, subject to reduction.

During the absence of the jury

The Judge said, if the jury found for the plaintiff he would give the defendants leave to move the Court, and if they found for the defendants he would give the plaintiff leave.

PROVISIONAL SPECIFICATIONS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—When provisional specifications were first required by the Patent Commissioners, they were to be mere outlines of the invention, just to give some idea of it. Since the appointment of the new Solicitor General, it has been determined that provisional specifications shall be as complete as possible, and that in chemical patents relative quantities of ingredients, when the precise ones cannot be given, shall be stated. This determination will cause much trouble and inconvenience, for although Mr. Woodcroft is fully competent to look after the mechanical specifications, there is no official about the Patent-office who knows anything of chemical ones. If any information is required, a mere laboratory chemist, whose chemistry has been confined to "*manipulating in a spoon*" is consulted. What is wanted is a sound practical chemist as a colleague with Mr. Woodcroft. When this is done we shall probably have a chance of obtaining from our law officers some information as to what a chemical patent is, a point at present not very well known.

I am, Gentlemen, yours, &c.,

An Owner of Chemical Patents.

July 14, 1857.

[Our correspondent has evidently overlooked clause VIII. of the Patent Law Amendment Act. By it the Law Officer is empowered to call in any scientific aid he may require.—Eds. M. M.]

SEED'S PATENT FLYER FOR SPINDLES.

COURT OF QUEEN'S BENCH, GUILDHALL, July 7.

(*Sitting at Nisi Prius, before Lord Campbell and a Special Jury.*)

SEED *v.* HIGGINS AND OTHERS.

Mr. H. Hill, Q.C., Mr. M. Smith, Q.C., and Mr. Hindmarch appeared for the plaintiff; and Mr. Knowles, Q.C., Mr. Grove, Q.C., and Mr. Webster for the defendants.

The plaintiff in this action, W. Seed, was a spindle and fly manufacturer at Preston, and he sued the defendants, Messrs. Higgins and Co., who were engaged in the same business at Manchester, to recover damages for the infringement of a patent granted to him on the 14th of July, 1846, for "certain improvements in machinery or apparatus for preparing, slubbing, and roving cotton and other fibrous substances." Among other pleas, the defendants denied the novelty and also the infringement of the plaintiff's invention.

It appeared that the plaintiff's improvement applied solely to "the flyer." It consisted "in the application of the principle of centrifugal force to the flyers employed in the above mentioned machinery, for the purpose of producing the required elasticity or pressure upon the bobbin, by causing the small spur or lever which conducts the sliver of cotton or other fibrous material on to the bobbin to press or bear against the same simply by the action of such force, instead of being effected by springs or such other mechanical pressure." But, on the 12th of August, 1854, the plaintiff entered a disclaimer, in which he disclaimed "all application of the law or principle of centrifugal force" as being part of his invention, or as comprised in his claim in his specification, "except only the application of centrifugal force by means of a weight acting upon a presser so as to cause it to press against a bobbin, as described in the said specification." This disclaimer seemed to be owing to the discovery which he made, that in the year 1830 a Mr. J. C. Dyer had taken out a patent for the application of that principle to the presser attached to his "flyer." Several witnesses were called, who confirmed the statement made by the plaintiff, that no flyer made under Dyer's patent had come into use; and that the plaintiff's "flyer" was an immense improvement upon those previously known, and had now come into nearly universal use. The difference pointed out by the witnesses was, that in Dyer's patent the weight which, by the revolution of the flyer on the spindle, produced the centrifugal force, was attached to the presser at the bottom of the flyer; but in the plaintiff's patent the presser was carried up one leg of the flyer, and had the weight attached to it at the top. The flyer which the defendants had used was produced to the witnesses, and it appeared to have the weight neither at the top, as in the plaintiff's patent, nor at the bottom, as in Dyer's patent, but a little above the middle. They, therefore, said it was more like Seed's than Dyer's; but if the weights had been a little lower, it would have been more like Dyer's than Seed's. The plaintiff's witnesses stated that the plaintiff's flyer was

superior, because, in the first place, it caused much less vibration to the machinery; and, secondly, it occupied much less room in the frame. At the close of the plaintiff's case,

Mr. Knowles submitted that the plaintiff's specification was bad, because it was shown that the same principle was contained in Dyer's specification of 1830, and also in Higgins's specification of 1834.

Lord Campbell said he should have been of the same opinion but for the plaintiff's disclaimer, in which he claimed the application of centrifugal force to a weight acting upon a presser at the top of the flyer.

Mr. Knowles said that the plaintiff, in his specification, claimed the application of the principle of centrifugal force, and he could not make his specification good by making a fresh claim in the disclaimer. The learned counsel also contended that if the particular mode only was claimed—viz., with the weight at the top of the flyer—there had been no infringement.

Lord Campbell said he would give the learned counsel leave to move on the first point; but it was for the jury to say whether there had been any infringement.

Several witnesses were then called by the defendants to show that flyers had been made with presses under Dyer's patent of 1830, and had been in successful use. Scientific witnesses were also examined to show that the defendants' was more like Dyer's than like the plaintiff's.

The jury having retired to consider their verdict,

Lord Campbell said he did not wish to try another patent cause at these sittings.

Mr. Knowles observed that there had been an unusual number tried.

His lordship added that, when Manchester had its own assizes, he hoped they would try their own patent causes (laughter.)

On their return the jury found a verdict for the plaintiff on both issues.

His lordship gave the defendants leave to move on the points reserved as to the effect in point of law of the disclaimer.

THE EMPEROR OF BRAZIL.—We learn from *Cosmos* that the Emperor of Brazil is the first sovereign who has requested to be accepted as an honorary member of the *Société d'Acclimatation* of France; and in the letter written, in the name of the emperor, by his first minister, it is stated that the request is made because the emperor considers the advantages of the society will be world-wide. He has also decorated six of its members—M. Geoffroy Saint-Hilaire, M. de Quatrefages, M. Auguste Deméril, M. Guérin Meneville, M. Lecomte d'Eprémesnil, and M. Richard—with the order of the Rose.

CAPTAIN KYNASTON'S METHOD OF LOWERING BOATS AT SEA.

THE most approved method of lowering and disconnecting boats at sea which has been brought recently before the public is that of Mr. Clifford, which was described and illustrated at page 97, of our No. 1747, for the 31st of January last. The uniform success of the trials made with Mr. Clifford's apparatus and the equally uniform praise accorded to it by naval officers have afforded excellent ground for the public approval. We find, however, from a pamphlet which has come into our hands,* that professional opinion upon its merits is by no means undivided; and although professional opinion may be erroneous, yet it is certainly deserving of the most careful examination. For this reason we propose to set forth Captain Kynaston's criticisms of Mr. Clifford's arrangement; and to follow it by a description of the improved system suggested by that officer. Captain Kynaston is favourably known as the author of a useful treatise on casualties afloat, and we must do him the justice to say that he puts forward his suggestions in a very straightforward and agreeable manner, giving at least a plain reason for every adverse judgment pronounced by him. His new essay will command the serious attention of naval men.

He first directs attention to the practice of rendering the larger boats of a ship useless, in an emergency, by stowing them in upon the decks, where they usually get encumbered with lumber of various kinds. Through the exertions of our Government and their agents, vessels now start on their voyages with a goodly array of boats hung at their sides; and the friends of our troops, emigrants, and passengers draw therefrom a good omen of their future safety. But in a few days the greater part of these boats are turned inboard upon the deck, and considerable time and self-possession are necessary on the part of the crew to remove them into the water in case of an emergency. "Now, many of these boats," says Captain Kynaston, "have probably been ordered to be fitted by Government with Russell's, Lacon's, or Clifford's apparatus for lowering and disengaging; but it is evident, for either of these plans to be efficient for an emergency, the boat at the time it is desired to lower her should be suspended outboard." At the same time

* A Review of the New Methods of Lowering and Disconnecting Boats at Sea, with a Proposed Amendment. By Captain Kynaston, R.N., C.B., &c., Author of a Treatise on "Casualties Afloat." London: J. D. Potter, 31, Poultry. 1857. The title selected for this pamphlet by Captain Kynaston is scarcely a fair one. The only new method of lowering boats (in addition to Captain Kynaston's own) which is "reviewed" is Clifford's; others are no more than mentioned.—EDS. M. M.

it is well known that it is to these boats, which are the largest, that recourse must be had for saving life. He suggests, therefore, that it is to this end, rather than to the rapid lowering of a quarter-boat, that the ingenuity of inventors should be directed; at all events, that they should so adapt their principle that, whether the boat be stowed inboard or suspended to the davits, it shall be readily and securely lowered.

Captain Kynaston admits that Mr. Clifford's plan is certainly adapted, with some exceptions, for the rapid lowering of a light boat at sea, to pick up a man overboard, or for quickly detaching, under ordinary circumstances, a boat for any purpose whatever, while the ship is in rapid motion. While at anchor its use is, he considers, inexpedient, and at sea it is, he thinks, open to the following objections :

1st. The boat being suspended to the davits by two "single pendants" wound round a reel in the boat, these pendants will be perpetually stretching, or rendering round the reel, thereby bringing the boat's weight on the gripes, &c., which, as they are fitted on Mr. Clifford's plan to pass over "prongs turned downwards," must in that case become detached. In a gale of wind, when quarter-boats work incessantly, they will be anything but secure. Or again, if the ship have any considerable heel at the time of lowering, and the boat be a lee one, owing to her weight acting at an angle with the prongs, the gripes will not easily fall off, and the operation therefore will be delayed. In certain cases where the use of "prongs" is inexpedient, slip-shackles are substituted for disengaging the gripes, &c. This involves the latter being let go with a jerk, which, in the case of a heavy quarter-boat, and one, moreover, suspended by single pendants, would cause great vibration, and very probably lead to her being stove, either before or during the lowering.

2ndly. These pendants, which in a large ship will be of a considerable length, being wound on a reel while wet, and one part riding over the other, and being further exposed to wet weather, will become rapidly deteriorated, and their inefficiency will not be detected probably until after the occurrence of an accident. At all events, a ship must take a large supply of these pendants to sea.

3dly. The threefold "nip or friction sheaves," used by Mr. Clifford for controlling the process of lowering in the boat with single pendants, so long as the ship has rapid motion (the pendants being moreover tapered*), will offer no impediment to disconnecting when they have run off the reel to their bare ends. On the other hand, Captain Kynaston maintains that, should the ship be at anchor, hove-to under canvas, or on shore in a surf, Mr. Clifford's process will be more tardy, if not more hazardous, than the old process of unhooking.

4thly. Should the pendants become sodden and swollen by rain or spray on the one hand, or hardened and stiffened by cold weather on the other, the difficulty of unreeving them through the "nip sheaves" will be materially increased, even if the operation be at all practicable.

5thly. The length of the long pendants on the reel being adapted to the height of the ship from the water while on even keel, and the rope being tapered from the size of six-inch to a bare end of one-and-a-half or two inches, according to the weight of the boat, supposing the ship to be hove-to under canvas with any considerable list, it follows that if the lee boat is the one to be lowered—the distance from the water being much less than if the ship were on even keel—there will be more of the pendants to be unrove when she reaches the water: the process, therefore, of disengaging will be still more tardy and precarious. On the other hand, should it be necessary to employ the weather boat, for the same reason she will be farther from the water, and, owing to the tapering of the pendants before alluded to, while in mid-air she will be hanging on a piece of two-inch rope, which is totally inadequate for her support; the consequences therefore will be, that she will become disconnected before the proper time, and an accident will occur.

6thly. If, in lowering—as often occurs in a sea-way to a boat—she becomes stove against the ship's side, as in the unfortunate case of the *Amazon*, she cannot be rehoisted by Clifford's plan until the proper tackles have been overhauled down and hooked, which will occasion considerable delay.

Lastly, that must always be looked upon as a dangerous power to commit into the hands of a ship's crew or passengers which enables them at any moment to lower themselves with great ease into the water without any assistance from inboard. There is certainly much force in this objection.

We now come to Captain Kynaston's plan, the claims of which he grounds on its simplicity, and on the fact that it is an adaptation of a common principle, long since adopted in our naval service for lowering a small boat at sea, especially a brig's stern boat or dingey. He avowedly lays but little claim to it on the score of originality, further than that of supplying the means of fitting the same plan to the purposes of

* We have not elsewhere met with this feature of Mr. Clifford's arrangement, viz., the tapering of the pendants.—Eds. M. M.

every class of boat on a ship's establishment. The plan referred to is shown in figs. 1 and 2. 1, 1, are the lower blocks of the usual tackles, into the thimble of which, besides the hook, 4, for hoisting up, are spliced the pendants or runners, 2, which are long enough to reeve freely through the clump-blocks, 3, which are hooked to the end ring-bolts, or to those at each end of the keelson, according to the spread of the davits. The clump-blocks in a very small boat are sometimes dispensed with, and the pendants simply rove through thimbles or through the ring-bolts themselves, and then the ends are hitched or belayed to the midship thwart, and let go together when the boat touches the water.

Fig. 1.

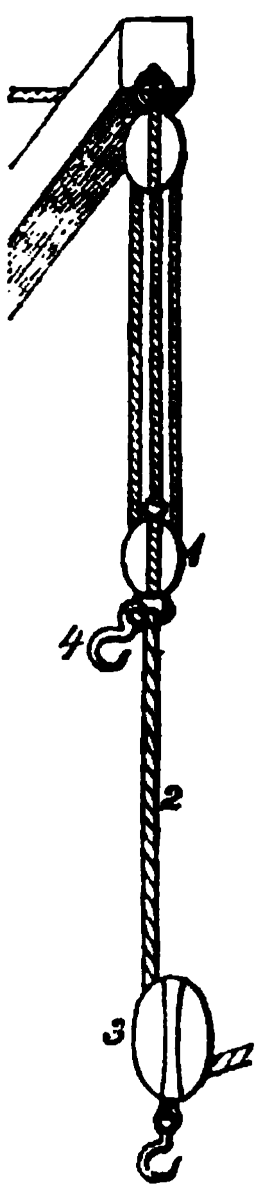
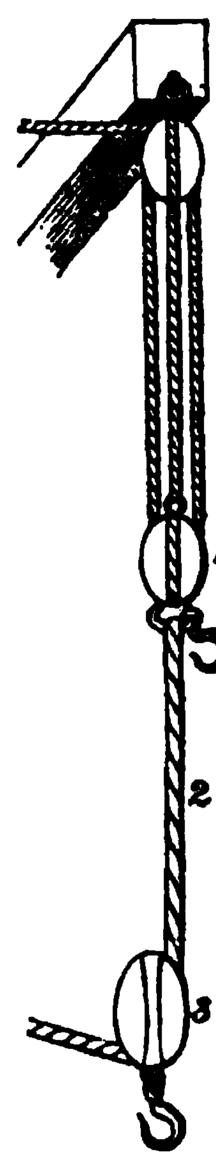


Fig. 2.



So convinced was the author of the great advantage offered by the above simple arrangement of short lowering pendants, that he has caused them to be fitted to one of the outside boats of every small vessel he has commanded, (four in the course of two years, 1851 and 1852 *); and he states they were instrumental in saving life, while the vessel still held considerable way.

Fig. 3 represents a boat fitted with Captain Kynaston's arrangement. A "slip capstan," 5, is firmly secured under the midship thwart, and revolves on an iron spindle in plates fixed to the thwart and keelson. To the barrel of the capstan is fixed a strong bolt or stud, 4, passing horizontally through its whole diameter, and projecting at each end. 1, 1, are the lower blocks of the usual tackles, with hooks and pendants as before described, with this difference, that a "cable-eye," 3, is spliced into the end, which, after reeving freely through the clump-blocks or "iron-strapped hearts," 8, are passed over the studs on the capstan, 4.* 6 is a small tackle-purchase of any given power, the standing part of which, taking three or four turns round the groove on the drum of the capstan, to which the end is secured, serves in lieu of bars or levers (which are objectionable) to secure the pendants with one or more turns round the barrel; the "purchase-fall" is then belayed to the most convenient part of the boat for letting go just before the boat reaches the water. 7, is a bar firmly bolted at each end close down to the keelson in a line fore and aft: this should have drift enough to allow, in addi-

Fig. 4.

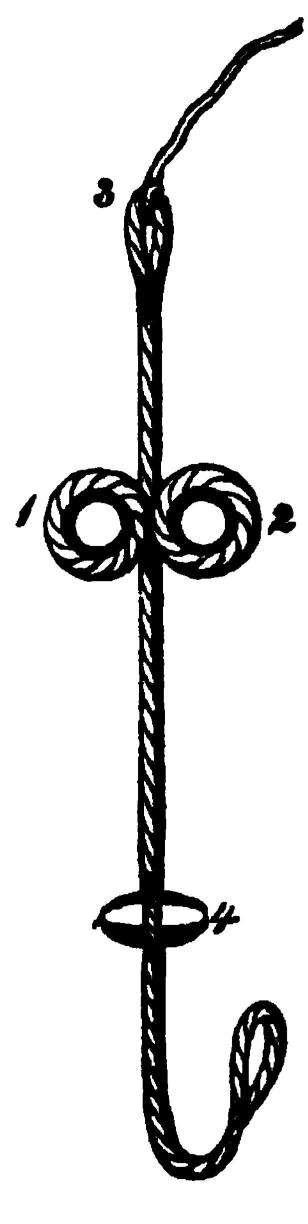
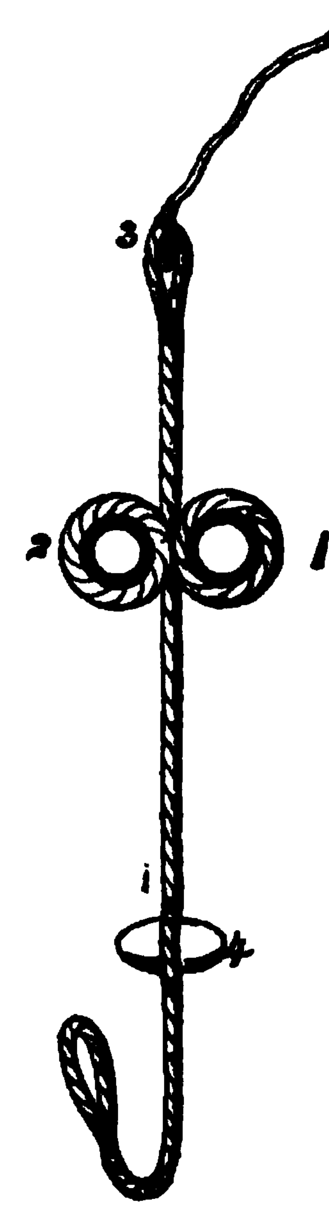


Fig. 5.



* H. M. brig *Persian*; H. M. steam sloop *Devastation*; H. M. cutter *Netley*; and H. M. schooner *Bermuda*.

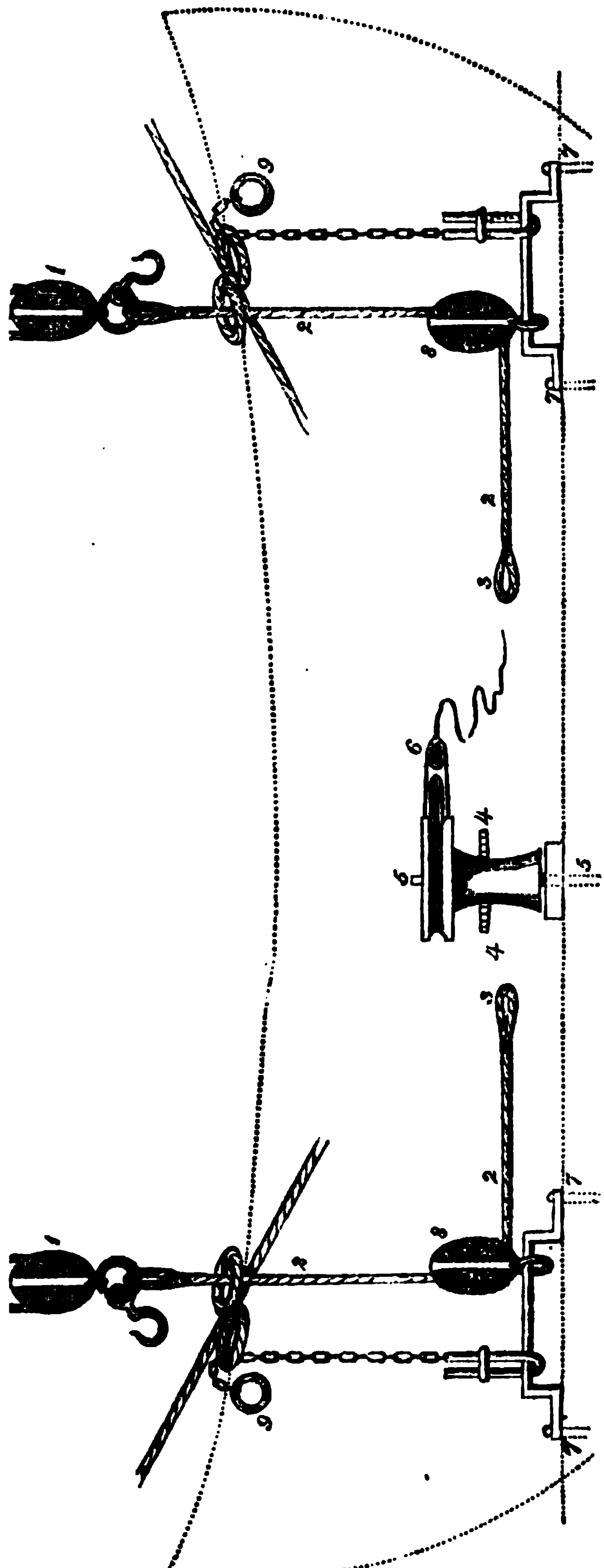
* The engravings are not on any particular scale, and merely represented for clearness, without reference to proportion. The pendants, 3, are represented too short; but they are sufficient with the details to illustrate their principle of action. The dotted lines in fig. 3 indicate the position of the gunwale of the boat.

tion to the clump-blocks or hearts, the slip-shackles of the chain-slings for hoisting to traverse freely, besides allowing room for two turns with the usual life-lines round the after part of the bolts. 9, 9, are the chain-slings by which the boat is hoisted up, which are fitted with a slip-shackle at the lower end, and the usual ring on the upper.

Figs. 4 and 5 show the "span" for supplying the place of the usual "steadying lines," to prevent a boat from canting while hoisting or lowering. 1 and 2 are two thimbles spliced into a piece of good rope. An eye is spliced into the end, 3, with a lanyard to set up the steadying span to an eye-bolt on the gunwale of one side of the boat. The other end, 4, is fitted with a becket and slip-toggle, which secures it to an eye-bolt on the other side of the gunwale; by this method the steadying span is readily let go when it is in the way after the boat is down. Through the inner thimbles, 2, the lowering pendants are rove, and through the outer thimbles, 1, the chain-hoisting slings are passed; and, as the ring of these slings is larger than the thimble, the latter serves to support them, and render the process of "hooking on for hoisting up" far more easy and practicable.

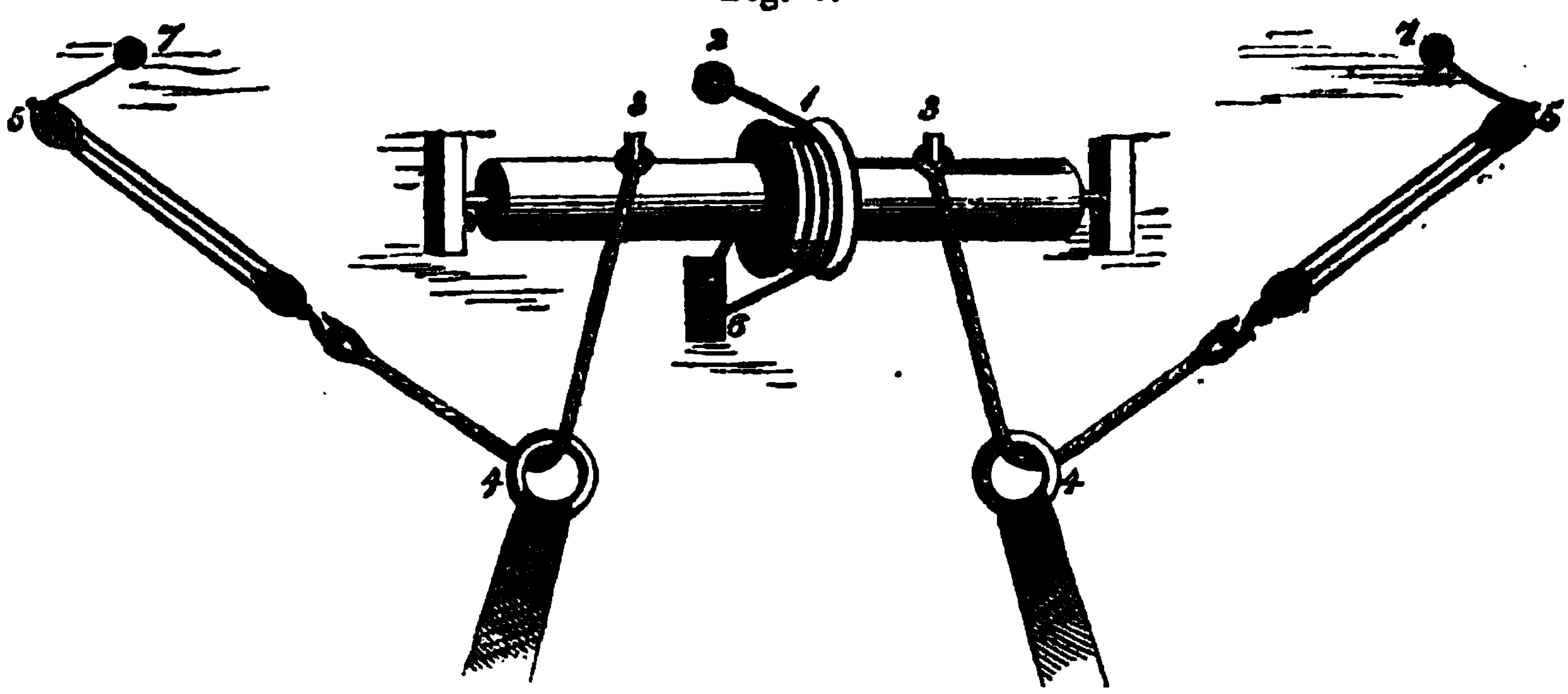
Fig. 6 represents the arrangement for disengaging the gripes, &c. A roller is

Fig. 3.



fixed to the ship between the davits outside, with the raised barrel, 1, in which a groove is cut to receive three or four parts of rope precisely the same as with the slip capstan, only a great purchase is not requisite here. The standing part of the said rope is fixed to the drum, three or four turns taken on it, and the end is then passed through a live sheave, 6, in the ship's side, then brought back round the drum, and again back through a pipe, 2, in the ship's side, and belayed in board. The small part of the barrel is fitted with the studs or bolts, 3, 3. 4, 4, represent the thimbles in the lower end of the boat's gripes which pass round the boat. In lieu of the ordinary lanyard, a rope-strap is fitted, long enough to pass over the studs, 3, 3, after being rove through the thimble, 4; the other end of the strap is set up to the ship's side with a jigger, 5, the falls of which pass inboard through the pipes, 7, 7.

Fig. 6.



When the boat is up, and the gripes passed as above, a pull of the purchase will cause the barrel to revolve, and to take as many turns as requisite for the security of that part of the gripe-strap which passes over the studs; the straps are then separately set up for a "full due" with the jiggers. It will also be readily seen that when it is required to lower the boat, by simply letting go the purchase-fall, the gripes will become disconnected and the boat clear.

Directions for Hoisting.—The chain-slings having been rove, and the slip-shackle secured, the boat is hoisted up by the tackles, the life-lines passed as usual, and the gripes secured as above. While this operation is in progress, the pendants are rove through the inside thimbles, 2, 2, figs. 4 and 5 then through the clump-blocks, or hearts, and secured with a turn and a half or two turns round the capstan by a pull of the purchase, which is then belayed. The slips are then knocked off, the chain-slings unhooked, and the boat remains suspended by the tackles and pendants, and ready for lowering.

Directions for Lowering.—The "gripe-roller" fall having been let go, the boat is lowered by the usual tackles (which should be always led inboard and belayed); and when she is near the water the officer of the boat, or the man appointed, takes his own time for letting go the capstan-fall, by which the boat becomes immediately disconnected. The tackle-falls are never let go from inboard until the boat is clear of the ship; otherwise, the pendants, not meeting the desired resistance, will be longer in disconnecting from the boat; and if the ship have rapid way through the water, and there be any sea, the boat will probably ship water during the delay.

The advantages which Captain Kynaston proposes to gain from the use of the above plan are as follows:—

1st. The boat, whether stowed inboard, or suspended to the davits, will be thoroughly secured for a gale of wind at sea with gripes and additional lashings boused up, and by letting go a single rope she will be clear for lowering or hoisting out. When applied for securing a boat stowed inboard, the "gripe roller" is fitted to the deck on one side of the boat, where the span shackle-boats for the gripes, &c., are usually placed.

2ndly. On reaching the water the boat will be also effectually and instantaneously disengaged by letting go the "capstan purchase-fall," at whatever rate of the vessel's progression, and also in a fixed position, as when a ship is hove-to under canvas, at

anchor in harbour, or ashore in a surf, or breakers.

3rdly. A boat may be taken in tow, and the eye of a towline passed over one of the studs on the capstan, and secured the same as the pendants, by which it may be slipped instantaneously when required. A whole string of boats may be thus separately and simultaneously disconnected.

4thly. The "disconnecting or slip-capstan," used in the aforesaid operation, is capable of supplying the place of the ordinary boat's windlass, is less bulky, and equally applicable for all a boat's purposes where a purchase is necessary.

5thly. A small iron capstan on the same principle, if fitted to the deck of a steamer on either side, may supersede advantageously the use of the capstan in the vessel towed, for equalizing the strain of the towing-cable, and assisting the steerage of the steamer through winding channels, besides securing the eye of the "standing cable," and slipping it easily when required. Its bulk would not exceed that of the spare bollard now fitted to steamers, and the "slip capstan" being worked by a tackle-purchase of any power requisite, in lieu of bars or levers, would tend to diminish the number of accidents which we occasionally hear of. For bringing to, heaving on, or slipping a "spring," for weighing the kedge or stream anchors, for backing up the regular capstan, and for many other purposes, in a ship of any class, this invention may be usefully applied.*

Such are Captain Kynaston's proposed improvements, and on carefully examining them we feel bound to say that they evince a thorough knowledge of what is practically required, and will, we doubt not, receive the entire approbation of many experienced officers of her Majesty's navy. At the same time the circumstances to which such arrangements apply are so very variable, and so opposite in their character, that we do not feel able to pronounce confidently upon the absolute merits of the rival inventions. Having laid the two before our readers as fully and faithfully as we could, we must, therefore, leave them to decide. It is certain, however, that whichever of the two be ultimately preferred, Captain Kynaston has earned the best thanks of the public for his skill and zeal. His example is well deserving of imitation, particularly by those naval and military men who, while they do nothing to advance their profession, are but too jealous of the efforts which more zealous amateurs seek to the best of their ability to accomplish.

* By order of the Admiralty, experiments were made in Plymouth Sound, on April 18th, when it was blowing half a gale of wind, in the presence of the Naval Commander-in-Chief and before experienced naval officers appointed to test the efficacy of the above propositions. On that occasion a boat, fully secured for a gale of wind, was successfully lowered and disconnected from a steamer while going at half speed, and with her engines stopped. At the same time the third proposition was successfully exhibited, and the invention, as regards its possible application to towing steamers, recommended as desirable.

RIFLED ORDNANCE.

(*Concluded from page* 28.)

We now come to the author's suggestions respecting the projectiles to be used with rifled ordnance. Recognising the great difficulty that is encountered in endeavouring to obtain a shot or shell combining all the necessary qualifications, he lays down the following conditions:—1st.—It is indispensable for a shot to be of a certain density or specific gravity, in order that a proper degree of range may be obtained with it. 2ndly.—Its axis should coincide perfectly with the axis of the bore before leaving the gun, and, therefore, it must completely *fill* the bore, otherwise its flight can never be depended upon; hence the fatal objection to homogeneous shot of a non-expanding metal. 3rdly.—Its centre of gravity should be thrown forward before its centre of figure, in order to give it more stability, and less inclination to turn over. This will allow of the use of a less turn in the rifling, which is an important object in guns of large calibre. 4thly.—Assuming the necessity of employing a compound shot or shell, an even expansion of that portion of the shot which is to take the grooves is absolutely necessary; for unless the axis of the shot be made to coincide exactly with the axis of the bore immediately upon its receiving the impulse from the powder, the chief advantages attending the expansion will be completely neutralized. Lastly.—It should be of a form offering as little resistance to the air as possible. These appear to be the chief requisites for projectiles generally, which are to be used with rifled cannon. It would be preposterous, he says, to deny the advantages of homogeneous shot; but they are wanting in one of the above qualifications, and this unfortunately is the most important with rifled guns; for it would be impossible to obtain any very great degree of accuracy (which, in fact, ought to be one of the chief advantages gained by the employment of rifled cannon), where this property (that of completely filling the bore) is wanting in a shot.

After repeated experiments extended over some months, made for the purpose of obtaining a shell in which should be combined all the necessary qualifications in

a manner adapted for practical use, the author arrived at the form of shell shown in fig. 3, which in this instance is three diameters long, but may be altered to any length, greater or less. The figure is half in longitudinal section, and half in external view. A is the body of the shell of cast iron; B an iron ferrule or ring, which is sufficiently loose to be moved up or down the body of the shell with facility. C is a ring of lead cast on to the shell, and dovetailed on the body in two or three places. D is another ring of lead, or other suitable metal, also cast on to the body of the shell. The hinder part of the shell is formed in the manner shown in the engraving, with the view of throwing the centre of gravity as far forward as possible, as well as to allow of the use of a fuse, and for other reasons, which would take up too much space to explain fully, as they are connected with a variety of experiments.

Fig. 3.

The principal feature in this shell is the ferrule or iron ring. In making experiments with shot more than two diameters in length, a difficulty was found in procuring with them an expansion sufficiently even to cause their axis to coincide with the axis of the bore of gun, unless by adopting means unsuitable for practical purposes. After many attempts, the author at length succeeded in effecting the object by means of the ferrule, B, which acts in the following manner. Upon the explosion of the powder, the lower ring, D, is caused to expand and fill the grooves, and at the same moment is driven, together with the iron ring, B, in a forward direction; the latter acting as a wedge upon the top ring, C, causes it to expand sufficiently to fill the bore, thereby occasioning a simultaneous expansion at two points. The first effect, therefore, of the explosion of the powder upon the shot is to force its axis to coincide with the axis of the bore; it then drives it out in a perfectly straight direction. The freedom of expansion allowed to the powder by the formation of the hind part of the shell permits the first action to be accomplished before the whole body of the shell is sensibly moved from its place.

Fig. 4 represents a half longitudinal section and half external view of a double shell. It is similar in form to the one just described, the principle of its construction being in every respect the same, except that instead of being a percussion shell it is fired with a fuse, E, by means of which (after passing over a certain distance) the hind part, H, is blown to pieces, at the same time freeing the top part, G, and lighting the fuse, F. The top part, or round shell, G, continues its flight according to the length of the fuse, when a second explosion takes place.* This shell

Fig. 4.

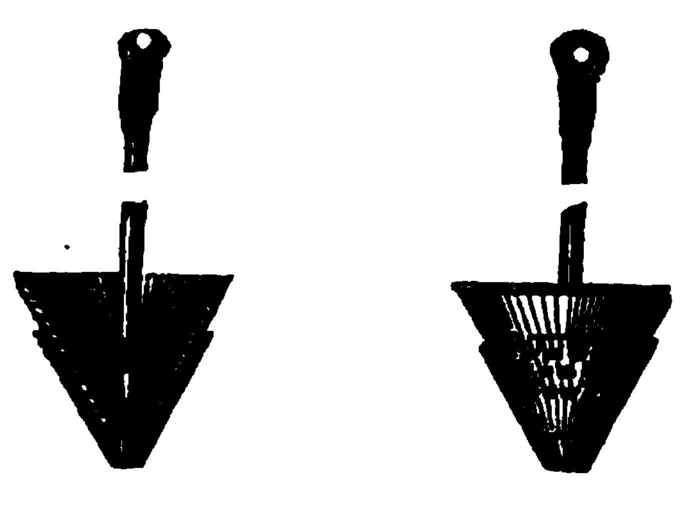
* It should be understood in this, as in all other parts of the work before us, where a description of any particular kind of projectile or mechanical contrivance is given, the author has simply chosen those for description which were found to answer the best (amongst many others) in his own experiments; and with the view, rather of illustrating certain principles, and at least one method of

would doubtless prove very destructive, when used against large bodies of troops, and when employed against shipping.

We must not conclude these remarks without adding that the work under notice contains much in the way of investigation and discussion, at which we have not even hinted; and although we are far from endorsing all that the writer states, we are confident that the book is well worth serious examination, and capable of affording valuable information to professional men.

GLOVER'S PATENT PUMP BUCKETS.

Mr. Howard Glover, of Lambeth, has patented an invention which consists in forming pump buckets, as shown in the engravings. They have a seat in the form of an inverted cone, perforated or pierced in the upper part, and a leather lining which fits in the same, and which rises



above the edge of the seat. Upon the down stroke so much of the leather as rises above the seat collapses or falls inwards to allow of the bucket descending easily in the barrel, and expands upon the upstroke when charged, occupies the bore of the barrel, and brings up its charge of liquid. Instead of leather, any other like yielding material may be employed, such, for instance, as vulcanized rubber.

carrying them into practice, than of recommending for adoption any individual shot or shell, of the identical form represented (which, provided the same conditions are observed, may be modified to any suitable extent); "For I am fully aware," he says, "that many things of this nature (although giving excellent results in experiments) frequently require to undergo considerable modifications, before they can be rendered in every respect fit for actual service. The true principles, however, of an art or science being once understood, and the effect produced by certain combinations clearly ascertained, the discovery of the most suitable mechanical means to be employed in carrying them out, will soon follow."

CHADWICK AND FROST'S NEW PISTON WATER METER.

The following is a brief digest of the paper read by Mr. Benjamin Fothergill, C.E., "On recent Improvements in Water Meters," at the meeting of the Institution of Mechanical Engineers, held in Manchester, June 26, 1857. The nearest approach to practical efficiency amongst the meters formed with flexible material, was Chadwick's rotary meter; but although they registered correctly, they had not been found satisfactory in regard to durability. Several by other makers were liable to objection of unequal extension of the flexible material. Amongst the piston meters were Kennedy's, Worthington's, Jopling's, and Chadwick and Frost's. In Kennedy's meter, the racked piston rod, and the use of Woodcock's patent rolling packing, were the distinguishing features. This meter was the best which had hitherto been brought into use; but there was some liability to stoppage, by the sticking of the tumbling-lever, when the valve was only partially closed, the water being then allowed to pass unregistered. There was also necessity for lubrication and packing, involving inspection. In Chadwick and Frost's piston meter, the latest and most important improvements had been effected, and the difficulties connected with previous attempts appeared to have been satisfactorily solved by the invention or application of a compound fluid motive valve, actuated by the pressure of the water, but not concerned in the measurement. The meter, consisting of a cylinder and piston, with Woodcock's rolling packing and other arrangements, was explained by the aid of diagrams. It was comparatively small in size, required no lubrication, had no tumbling weights, worked smoothly, allowed no leakage, and from an examination which he had made he found it to register with a nearer approach to absolute correctness than any other. There was one at work in the adjoining room, and a larger one constructed to measure eight thousand gallons per hour was placed in the Water Works' Yard, Town Hall, Salford. Mr. Fothergill then remarked that he believed this to be the best meter at present produced, and if any one could invent a better, it would afford him pleasure to see it.

Mr. Chadwick remarked that it had only been patented a few months, and was brought forward earlier than was intended. After giving seven years' attention to the subject of water meters, he was acquainted with the difficulties, and knew that a large amount of durability was requisite in every part. There was a great want of a perfect meter, and he thought this one would prove

to be free from some of the defects which had been referred to, and be economical in construction.

MECHANICAL AND GEOMETRICAL DESCRIPTIONS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—If the following suggestions deserve a place in your valuable periodical, I should be glad to see them there. They relate to the method generally adopted in the explanation of mechanical and geometrical descriptions and diagrams, which are, it must be confessed, generally sadly obscure and confused. It is, in most cases, the failing of persons who are familiar with their subjects, to think that everybody else is so too, and therefore they write in a technical and indefinite mode of expression, which, though it satisfies their own minds, leaves their readers in the dark. Scientific persons seem to be often little aware that explanation itself is a science, and a most difficult one. The conveyance of difficult ideas from one brain to another is, and must ever be, a serious operation; everything, then, in it should be in as simple and as common words as possible, leaving nothing which will admit of *two* meanings, as is often the case, without being tiresomely prolix or unsatisfactorily brief. Were such a plan carried out, the paths of science would be smoothened down, and progress facilitated. Any good workman would then have nothing to do but to lay the description before him, and work his way, instead of having to guess the author's meaning, and have to half invent the thing himself. The fault sometimes is owing to carelessness, sometimes to pedantry, sometimes to inability, and sometimes to duplicity—it being often the interest of the author to keep his subject a secret, but explaining so much of it as shall secure to him the right of being considered the originator, should this be disputed. I will not, however, particularize the faults of which I complain, excepting as relate to diagrams, and will endeavour to offer a remedy regarding them.

In the common plan these are lettered quite at random, leaving the student to grope his way as he can, and waste half of his attention in looking after the references. But I propose the placing of the letters in alphabetical order from left to right, and descending from the top, as required.

Another suggestion, to show the similar sides of triangles, may be also of service, by calling each triangle by different names; say one shall be named white and the other black, and the similar sides in each being 1, 2, and 3. Then we know immediately how to compare them—1 white being, in similar triangles, similar to 1 black, 2 white to 2 black, and 3 white to 3 black. In some cases the homologous sides are so evident as not to require this contrivance; but in others it is quite otherwise, and the adoption of the names prevents the necessity of continually referring to the diagram.

I am, Gentlemen, yours, &c.,
LEWIS GOMPERTZ.

THE METROPOLITAN POSTAL DISTRICTS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Seeing in the number of the *Mechanics' Magazine* for July, 4th inst., that Mr. Stanford, stationer, of Charing-cross, proposes to manufacture envelopes each with a designation (on their inner face) of some one of the several London local districts, I beg leave to propose to the trade in general, through the medium of your excellent and interesting publication, that they should sell packets of envelopes with the initials of the different postal districts marked on each envelope; such initials, for the sake of helping the Post-office clerks in sorting the letters, might be printed in red ink, thus at once showing the district without having any occasion to refer to the direction. Suitable cases might then be manufactured and sold containing packets of envelopes with the different initials marked on them. A map might also be attached to the case for reference.

I am, Gentlemen, yours, &c.,
JOHN C. SIKES.
Chevening Rectory, Sevenoaks.

MISCELLANEOUS INTELLIGENCE.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—The twenty-seventh meeting of the British Association for the Advancement of Science will commence in Dublin on Wednesday, the 26th of August, 1857, under the presidency of the Rev. H. Lloyd, D.D., D.C.L., F.R.S. L. and E., V.P.R.I.A. Notices of communications intended to be read to the Association, accompanied by a statement whether the author will be present at the meeting, may be addressed to John Phillips, Esq., M.A., F.R.S., Assistant-General Secretary, Magdalen-bridge, Oxford; or to Lundy E. Foote, Esq., Rev. Professor Jellett, and Dr. Hancock, Local Secretaries, Dublin.

A SINGULAR BAY.—From time immemorial the waters of the little bay of Vulcano, at Santorin, have been spoken of as possessed of the singular property of cleansing the coppered bottoms of ships in a re-

markable manner. Recently, the *Solon*, a French screw steamer stationed on the Levant, was taken into the bay to test its effects. Although thickly coated with red-lead, the bottom of the vessel was at the time very foul with marine vegetation, &c.; but after a short stay in the waters, the weeds and shells were so loosened, that on the bottom being slightly brushed with a broom, they fell off, leaving the bottom quite clean. The vessel's speed, when she was got under weigh, was found to have increased a knot an hour. Four other French vessels were subsequently taken into the bay, and their captains were unanimous in stating that the same result was obtained. Two English corvettes were finally taken into these singular waters, and the same effects were produced upon them.

THE TUNNEL OF MOUNT CENIS.—This grand manifestation of the mechanical enterprise of our age has been decided upon by a vote of the Sardinian parliament. It is Professor Colladon, of Geneva, who is the originator of the plan, and it is said that some preparatory experiments are to be made on the Mount Salève, near that city, at which the premier, Count Cavour, will be present. The Mount Cenis Tunnel will have a length of 12 kilometres, and it is asserted that the stupendous engine can operate at a distance of 6 to 7 kilometres (!) Some improvements have been lately added by the engineers, Messrs. Grandis, Grattoni, and Sommeiller.—*Builder.*

SHIP-BUILDERS' FESTIVAL.—On Saturday last, the beautiful brass band, thirty in number, recently established through the liberality of Messrs. Richard and Henry Green, the eminent shipowners of Blackwall, and under the able leadership of Mr. Wilkinson, of the Royal Naval School, Greenwich, assembled in the mould loft of their shipbuilding yard, where they were joined by the foremen of the establishment, and after marching a short distance to a spirited air, were conveyed by vans to the Crown Inn and Pleasure Grounds, Loughton. Upon arriving there, the whole partook of a sumptuous repast, and afterwards engaged in various athletic sports provided for their amusement, being enlivened by an appropriate selection of popular music. They then proceeded to the country residence of Mr. H. Green, at Walthamstowe, who, together with a distinguished circle of friends, cordially greeted them. After the band had performed in the beautiful grounds surrounding the mansion for nearly an hour, the visitors sat down to a most bountiful supper, presided over by their esteemed master and his lady. Several toasts were given and heartily responded to, and on the health of Mr. H. Green being drunk, that gentleman replied in a very hearty and appropriate speech, expressing the great pleasure he experienced in receiving them, and a hope that the visit would be repeated annually. Three cheers were then given for the excellent host and hostess, and after performing the National Anthem, the company withdrew, the band playing a march, and returned home, highly pleased with the day's amusements, and grateful to the kind friends who had so generously provided for their comfort and happiness.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

OLLEY, W. H. *Improvements in obtaining photographic impressions or pictures of microscopic objects.* Dated Nov. 6, 1856. (No. 2614.)

This consists of arrangements of apparatus whereby photographic impressions of microscopic objects may be obtained by reflected light, and which are carried into effect by the combined use of the microscope, the camera lucida, or other reflector or reflectors, and the camera obscura.

WEBSTER, J. *A new or improved instrument or apparatus for transmitting hydrostatic and pneumatic pressure, which said instrument or apparatus is applicable to pressure-gauges, safety-valves, thermometers, pumps, and other like machines.* Dated Nov. 6, 1856. (No. 2615.)

This is an instrument in which a piston or movable part works loosely in a cylinder or fixed part, the two parts being connected by a tube of caoutchouc supported within or without with a helical coil of wire, and the application of the same to pressure-gauges, safety-valves, thermometers, pumps, and other like machines.

CATO, P., J. MILLER, jun., and J. AUDLEY. *Improvements in the manufacture of ships' knees.* Dated Nov. 6, 1856. (No. 2616.)

In this invention the iron is first prepared by forging it to a tapering form from the part to be bent towards each end by a plain-faced hammer or tool worked by steam or other power. The face of the anvil or the tool on the anvil is formed with grooves according to the form of the intended knees. The hammer or tool is formed with a face corresponding with the interior bend or angle to be given to the knee, and the anvil or tool is made hollow to correspond with the exterior bend or angle.

BROOMAN, R. A. *Improvements in the manufacture or cranked axles and shafts.* (A communication.) Dated Nov. 6, 1856. (No. 2617.)

This consists in a method of manufacturing cranked axles and shafts, in which the iron is neither twisted nor cut. The iron is prepared in suitable bundles or faggots, and additional pieces are welded on to form each crank, and the cranks are stamped out by stamps or plungers worked by a forge or steam hammer, and driven down into counter moulds or matrices.

CHAPMAN, F., and C. BOWYER. *A method of purifying and disinfecting intestines and manufacturing gelatine therefrom.* Dated Nov. 6, 1856. (No. 2618.)

This consists in first thoroughly washing the intestines in water, then reducing them

to small pieces, and immersing them twice in or covering them twice with sulphurous acid. The intestines are next thoroughly washed in clean water, and then a solution of alum is poured over them, and their conversion into gelatine is effected by steam applied in a double-sided or jacketed pan.

DIRCKS, H. *Improvements in the preparation and application of the materials for making worts and washes in brewing, distilling, and like operations, and in the apparatus connected with the same.* Dated Nov. 7, 1856. (No. 2619.)

These improvements consist—1. In the application of corn or flour mills for grinding the malt or the unmalted grain, combined with the employment of bolting machines or wire or other dressing machines for dressing the malt-meal, or other meal. In making worts and washes from the materials thus prepared, the patentee first treats the flour by mixing it intimately with moderately-heated water, and keeps the mixture at a regulated temperature in pans until the diastase of the malt has sufficiently saccharised the starch. He next operates on the bran or husk by itself, or mixed with the pollard, using hot water therewith, and leaves the mash covered up for some time to saccharify the small adhering portion of starch, and to obtain the colouring and flavouring principles of the husk.

SPENCE, W. *Improvements in apparatus used in the manufacture of silk and other fibrous materials.* (A communication.) Dated Nov. 7, 1856. (No. 2622.)

This consists in the arrangement of mechanism by means of which the silk is drawn and twisted as it proceeds from the cocoon in such a manner as to combine the operations of opening or preparing and spinning ordinarily employed in this manufacture; also, in the twisting of other kinds of threads, yarns, or fibres, by the same apparatus.

HOLT, A., and J. BENTLEY. *Improvements in machinery for weaving stuff and other goods.* Dated Nov. 7, 1856. (No. 2624.)

These consist—1. In lifting the stop-rod of the loom by the action of the picker. 2. In a mode of working the cylinder by an eccentric placed on the picking shaft of the loom. 3. In a mode of working the shuttle boxes, and especially the causing of such boxes to move as near as may be in a straight line, or horizontally from back to front of the loom.

VUITTON, L. J. V. *An improved apparatus for consuming smoke.* Dated Nov. 7, 1856. (No. 2625.)

The patentee forms an open space through the length of the fire surface, through which the fuel is raised up into the fire and so supplied for combustion. The entrance is formed of bars reaching below the bottom of the ordinary bars. Immediately below this opening a chamber is placed in which the receptacle containing the fuel ascends. Other arrangements are included.

DICKINSON, J. *Improvements in machinery used in the preparation of cotton or other fibrous substances for spinning.* Dated Nov. 8, 1856. (No. 2626.)

The patentee applies to the drawing frame an apparatus for preventing the breakage of the coiler or damage to the sliver, the said apparatus causing the frame to be stopped when the can containing the sliver becomes sufficiently or unduly filled and pressed.

BERTRAM, G., and W. MCNIVEN. *Improvements in the manufacture of paper.* Dated Nov. 8, 1856. (No. 2627.)

This relates to an improved arrangement of the parts of, as well as the mechanical action of, the knotting machine or pulp strainer, by which a more effective knotting or pulp straining action is to be secured than has hitherto been obtained.

PORTER, W. *Improvements in the grinding of cements and other substances, and in the construction of millstones for the same.* Dated Nov. 8, 1856. (No. 2629.)

This consists—1. In a method of constructing millstones to grind cements and other hard substances, after the manner of a corn mill. 2. In the use of a spring cushion in connection with the mill spindle, in such manner that the whole weight or part thereof of the upper millstone may be thrown upon the cushion to regulate the pressure of the runner, and to maintain the centre pin of the mill spindle in close contact with the rim of the upper millstone.

GOSSAGE, W. *Improvements in the manufacture of carbonates of zinc, of iron, and of manganese, and in the useful application of such carbonates.* Dated Nov. 8, 1856. (No. 2630.)

Claims.—1. The manufacture of carbonates of zinc, of iron, and of manganese, by decomposing solutions of sulphates or chlorides of such metals by means of carbonate of magnesia, or by means of caustic magnesia, and subsequently converting the hydrated metallic oxide produced into carbonate by means of carbonic acid gas. 2. The manufacture of carbonates of zinc and of iron by decomposing solutions of chloride of zinc or of iron by carbonate of lime, or by caustic lime, and subsequently converting the hydrated metallic oxide produced into carbonate by means of carbonic acid gas. 3. The application of carbonates of zinc, of iron, and of manganese, manufactured as before described, by the decomposition of sulphuret of sodium contained in such alkaline liquors as are obtained by the lixiviation of rough soda (black ash) in the well

known soda manufacture, thereby producing metallic sulphuret, also carbonate of soda. 4. The useful application of carbonate of manganese (manufactured by decomposing solutions of sulphate or of chloride of manganese by means of carbonate of magnesia or by means of caustic magnesia with subsequent application of carbonic acid) to the production of black oxide of manganese, by decomposing such carbonate of manganese (so manufactured) by heat in the presence of atmospheric air.

Vaughan, C., W. J. and R. *A new or improved strap or band for working stamps, raising weights, and transmitting power generally.* Dated Nov. 8, 1856. (No. 2631.)

This consists of a strap or band made of a thin strip or strips of iron, copper, brass, or such other metal or alloy as combines sufficient strength with the requisite elasticity.

Morphet, W. *Improvements in producing the velvet pile and Witney finish in cloths, and in machinery or apparatus for the same.* Dated Nov. 8, 1856. (No. 2633.)

The nap is raised by the action of wire card, after which it is submitted to the action of a glutinous substance, which forms the nap or pile into a series of small sectional curves, which is known as the Witney finish.

Brooman, R. A. *Improvements in preserving provisions.* (A communication.) Dated Nov. 8, 1856. (No. 2637.)

This consists in the employment of a product derived from carragohem or other moss, varec, *fucus crispus*, kelp, sea-wrack, or other substance capable of yielding a similar extract, or of any matter containing iodine; and also in employing stearine or other fatty matter for sealing the cases containing the provisions.

Brooman, R. A. *Improvements in machinery for cutting and dressing stone, marble, and similar materials.* (A communication.) Dated Nov. 8, 1856. (No. 2638.)

The object here is to imitate hand cutting. The distinctive features lie in the manner of working the cutting chisels. The stone is carried in a horizontal direction upon a movable platform, while the chisels are made to act upon its upper surface in an inclined direction, and opposite to that of the feed. These chisels are supported in guides, formed in the lower cross rail of the frame. Each guide stock is connected to a toggle lever, the upper end of which is fastened to the upper cross rail of the frame, and it is by acting upon the centre joint of the toggles, whereby they are made to vibrate, that motion is given to the chisels. The motion is imparted by cams.

Bessemer, H. *Improvements in the manufacture and treatment of iron and in the manufacture of steel.* Dated Nov. 10, 1856. (No. 2639.)

Claims.—1. The refinement of molten crude iron or melted pig or partially refined iron by causing the same to be mechanically mixed and agitated with slags and other suitable fluxes or purifying agents in a vessel. 2. The refinement or rendering malleable molten iron that has previously been treated by means of jets of air or of steam forced into the same, by agitating such iron with slags and suitable fluxes or purifying agents. 3. The subjecting of molten iron which has been previously agitated with other matters, as described, in a vessel to jets or currents of air, or of steam forced into and among the fluid metal. 4. The purification and conversion of fluid crude or partially refined molten iron into steel, or into malleable iron, by agitating and mechanically mixing therewith fluxes or other matters combined with the use of streams of air in a vessel, whether the streams of air or steam be used simultaneously with, or before, or after the mechanical agitation of the said vessel. 5. The running in a divided state from a converting vessel or apparatus fluid metal which has been treated by the action of streams of air or steam into molten slag or scoria or purifying agents as described.

Barlow, A. *Improvements in mashing apparatuses.* Dated Nov. 10, 1856. (No. 2641.)

This invention consists in causing the agitators to rotate horizontally, and in forming the agitator blade heads with a broad or enlarged surface. To maintain the proper temperature in the tun, it is formed entirely, or partly, with a jacket or case, in which the liquid is placed and heated by steam which is caused to circulate in pipes introduced therein. The false bottom is formed of a series of cones or pieces, circular at top, and tapering off to the bottom thereof. Each cone is perforated, and the cones or circles are so placed that each perforation or aperture is about half an inch distant from that next to it.

Manceaux, F. J., and E. N. Vieillard. *An improvement in breech-loading fire-arms and ordnance.* Dated Nov. 10, 1856. (No. 2642.)

This invention consists in a method of preventing the escape of gases from the breech of breech-loading fire-arms and ordnance, by means of a conical or partly conical plug, fitting into a conical seat in or at the back end of the barrel.

Stones, W. *An improved mode of sizeing paper.* Dated Nov. 10, 1856. (No. 2643.)

The object here is to cause the size to enter the body of the paper, and this is effected by causing the unsized web of paper to pass over air boxes from which the air is exhausted, and as the paper passes along, a current of size issuing from a tube in

which is made a fine slit or a number of perforations is projected on to the surface of the paper, and the partial vacuum made in the air box causes the size to enter the body of the paper.

GASKELL, P. *The admission of steam into the cylinders of steam engines by an equilibrium valve.* Dated Nov. 10, 1856. (No. 2644.)

This valve is composed of two plates, made either to revolve on a metal shaft in the case of a rotary valve, or to slide in the case of a sliding valve at a distance of about 2 or 3 inches apart within a metal valve box, the valve plates and box being ground smooth, and fitted steam tight, except at the apertures in the lower plate. The steam is first admitted into the valve box in the space between the two plates. The pressure of the steam in the valve box on the upper plate thus counterbalances its pressure on the lower plate.

SOMERVILLE, J. *Improvements in weaving.* Dated Nov. 10, 1856. (No. 2645.)

This consists of means to be employed in or upon looms for weaving corded, checked, or "cross-over" fabrics. The essential object here is the so arranging the details of the heddle-making mechanism as well as the parts actuating the catch threads of the warp, that a simple means, both of keeping open any given shed of the warp for the passage through it of several weft threads to form the "cord" of the fabric and the proper working of the catch threads for holding the weft shots when crossing and re-crossing in one shed, may be secured.

SMITH, W. *Improvements in machinery for sewing cloth and other materials.* (A communication.) Dated Nov. 11, 1856. (No. 2648.)

This cannot be described without engravings.

JONES, J. F. *Improvements in the manufacture of rollers or cylinders for printing fabrics, and in machinery to be used in manufacturing the said rollers or cylinders.* Dated Nov. 11, 1856. (No. 2649.)

The patentee claims the making the hollow cylinders which are placed between the mandril or axis on which the roller when complete is intended to work, and the copper shell or tube forming the exterior portion of such rollers—1. By casting such liners in metal moulds with mandrils inserted of such a form that the liners are produced of the required size, taper, and with a nib formed longitudinally in the interior. 2. By shaping the interior of the liner by certain machinery. 3. The securing of the copper shells or tubes to the liners by soldering, &c., or by screwing one upon the other. 4. For embossing a design upon metal shells or tubes by pressure in moulds.

CLARK, W. *Improvements in the manufacture of barytes and strontian, and their salts, and in their application to various purposes.* (A communication.) Dated Nov. 11, 1856. (No. 2650.)

Claims—1. The production of chloride of barium or strontian from the liquid residuums of the manufactures of chlorine or chloride of calcium, and natural sulphates of baryta or strontian. 2. The preparation of the nitrate of baryta from the nitrate of soda and the chloride of barium. 3. The use of chloride of barium for preparing hydrochloric acid, tartaric acid, and artificial sulphate of baryta, and the application of the sulphate, and also of the sulphates of strontian, to distemper colouring or painting. 4. The preparation of nitric acid by the wet process, and the preparation of caustic baryta with the nitrate obtained as described. 5. The use of the sulphuret or oxysulphuret of barium for obtaining, by their combination with hydrated oxide of manganese, hydrated baryta free from sulphur, and in the application of the hydrate to the hardening of plaster objects, or to the fixing of colours applied with size or fecula. 6. The use of the oxide or of the sulphuret of barium for the preparation of stearic and acetic acids.

BAINES, H. *Improved machinery or apparatus to be applied to hoisting and other lifting machines.* Dated Nov. 11, 1856. (No. 2655.)

This relates to a method of stopping the ascending or descending room or box employed in hoists in warehouses, &c., in the event of the rope breaking. Bearing upon the suspensory rope are eccentrics or pulleys; attached to levers in connection with vertical rods extending from the top to the bottom of the hoist, well, or pit, at convenient distances in the said rods, are placed slots, arranged in connection with moveable, vibrating, or swinging catches attached to the upright of the hoist. If the rope breaks, the pulleys or eccentrics will give way, and cause the vertical rods to drop by their own gravity, thereby bringing the slots in the vertical rods to bear upon the catches or stops, causing them to assume a horizontal position, and come in contact with a rack upon the sides of the box or chamber, thus forming a stop or support for the room or box. Certain improved catches are also used.

JOHNSON, J. H. *Improvements in projectiles.* (A communication.) Dated Nov. 11, 1856. (No. 2656.)

This consists in arranging a spherical shot, shell, or other spherical projectile, so that when it is placed in the piece ready for firing, its centre of gravity will be directly in front of its centre of figure, and its

axis of rotation will coincide with a line passing through the centres of figure and gravity. A motion of rotation is imparted to the projectile by inclined grooves in the piece, through the intervention of a "gromet" or ring of some compressible material.

BERNARD, J. *Improvements in the manufacture or production of boots and shoes or coverings for the feet, and in the machinery or apparatus employed in such manufacture.* Dated Nov. 11, 1856. (No. 2657.)

This relates—1. To a holding apparatus in which the boot or shoe to be pared is fixed, and is capable of being turned round therein so as to present any side or edge of the sole or heel to the paring instrument. 2. To apparatus for buffing or polishing the soles. 3. To cutting out the soles or other parts of boots and shoes. 4. To a cutting surface, and consists of wood or any fibrous material compressed so as to render the grain or fibres perfectly homogeneous. 5. In the use of an inner sole composed of fibrous materials combined with adhesive materials, in some cases in connection with a thin skin or leather sole. 6. To lasts which may be more readily removed. 7. To a mode of ensuring the entrance of the piercer into the same holes it had previously made in the lasts. 8. To shaping the split lifts used in making the heels of boots and shoes, and consists in pressing the strip of leather to form the split lift into the desired shape between a pair of corrugated dies, the lower one having a raised edge round it corresponding to the required contour of the lift. 9. To the cramping (or preparing for lasting) of the heels and toes of boots and shoes. 10. To splitting the lifts by passing a strip of leather between a fixed knife and a roller, which roller is so shaped as to enable the strip to be cut diagonally across its thickness into two lifts.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

HUNTER, C. *Improvements in effecting the operations of drying, heating, and ventilating.* Dated Nov. 6, 1856. (No. 2612.)

This relates to arrangements of furnaces, heating chambers, pipes, &c., for heating, drying, and ventilating.

PARKER, J. *Certain improvements in machinery or apparatus for roasting coffee, or for other similar purposes.* Dated Nov. 6, 1856. (No. 2613.)

These relate—1. To an arrangement of apparatus for placing a cylinder used for roasting in and removing it from the fire; and 2. In a method of carrying away the steam, moisture, and other deleterious matter from the coffee, chicory, or other like substance, whilst submitted to the operation of roasting, by means of a perforated tube.

PORECKY, A. *Improvements in the construction of safety match or lucifer boxes.* Dated Nov. 7, 1856. (No. 2620.)

The boxes are to be provided with a wedge-shaped chamber to contain the matches. The narrow end of the chamber is opposite a bar passing through the box, elongated at one end, to be pressed, and carrying above a parallel pin, and having its shortest end under a hole, through which the matches are to be protruded for use, near which may be arrangements for lighting.

OLLIS, T., jun. *Improvements in machinery or apparatus for cutting paper, cardboard, millboard, scaleboard, leather, and other substances of a light nature.* Dated Nov. 7, 1856. (No. 2621.)

This consists—1. In using with the cutting machine an adjustable table, so that its position can be varied from the level to an inclined position, to alter the downward course of the cut. 2. In the application of a side guide, whereby the squaring or inclining of the material is effected. 3. In giving a leverage and fulcrum action, and a peculiar descending motion to the knife by means of a groove, or other guiding arrangement placed at any angle between 45° and 90° between the sides of the machine. 4. In the employment of holders in addition to the ordinary platen or support for giving an additional back pressure to the material to be cut behind the platen.

CASARTELLI, J. L., A., and L. *Certain improved apparatus for ascertaining the density of water in marine steam boilers or generators, for the purpose of preventing saline incrustation.* Dated Nov. 7, 1856. (No. 2623.)

This apparatus consists of two tubes, the extremities of which are supported in two cocks or taps. Upon one of these is marked the word "blow," and upon the opposite one "limit." Each tube contains a float adjusted to certain gravities, that in the tube "blow" being the highest. As soon as the density of the water reaches that of the float in the tube "blow," the latter will rise to the surface of the water in the tube, thus indicating that more water may be let into the boiler. But the float in the tube "limit" will not rise until the density exceeds that of the float in the tube "blow" to a certain degree. Upon the rise of the float in the tube "limit" it becomes imperative that water be supplied to the boiler.

HUXTABLE, L. *Improvements in pianofortes.* Dated Nov. 8, 1856. (No. 2628.)

This consists in arranging the cases of

pianofortes so that they can be opened and closed by a treddle at the command of the performer, so as to modulate the sound as he may desire.

REID, A. *Improvements in treating iron so as to render it impervious to continuous oxidation.* Dated Nov. 8, 1856. (No. 2632.)

The inventor places the iron in a furnace, and completely covers its surface with soot or other similar matters. The temperature is then raised to a red or white heat, and continued for fifteen or thirty minutes, or longer, according to the mass of iron to be operated on. He then removes it from the furnace and allows it to cool; the surface is then thoroughly cleansed, and is found covered with a coating which is said to be impervious to rust under all circumstances.

ALAUX, J. B. E. V. *A lubricating composition.* Dated Nov. 8, 1857. (No. 2635.)

This is composed of vegetable oils mixed with other paraffine or stearine, or both. Resin oil, distilled at a very low temperature, is preferred, and is subjected to three distillations; the product of the first and third is not used, but only the second distillation. About six parts of the oil thus prepared are placed in a double bottom still, heated by steam to about 100° of Centigrade's thermometer. To this is added one part of mutton tallow heated, and pressed, or squeezed, and liquified. It is then stirred and left to cool.

WALKER, T. *An improved method of lubricating the interior of the cylinders of steam engines for reducing the friction of the pistons thereof.* Dated Nov. 8, 1856. (No. 2636.)

This consists in the use of certain parts of the apparatus described in the specification of the patent No. 785, 1855, for mixing oil, &c., with the steam before it enters the cylinder of the engine, instead of conveying the oil to the piston and other parts as therein stated.

DOLBY, E. T. *Improvements in printing several colours at one time from a single stone, plate, or block.* Dated Nov. 10, 1856. (No. 2640.)

This consists in applying several colours to the same stone, &c., and is accomplished in some cases by means of perforated plates in the nature of stencil plates, and in other cases by means of rollers having recesses therein to receive the various colours, the recesses being so formed as to correspond with the required parts of the design to be coloured thereby.

JOHNSON, J. H. *Improvements in apparatus for printing electro-telegraphic despatches.* (A communication.) Dated Nov. 10, 1856. (No. 2646.)

This relates to a construction of printing apparatus which may be attached to any ordinary arrangement of recording mechanism, but is particularly applicable to dial indicating or recording instruments. A local battery is employed for working the printing mechanism.

PEARCY, R. *Improvements in machinery or apparatus for giving additional cohesiveness and torsion to fibrous substances in the drawing and other processes.* Dated Nov. 10, 1856. (No. 2647.)

This relates principally to the drawing or tube frame, in which the slivers are drawn out, and the fibres laid side by side to prepare them for spinning. The object of this invention is to give this sliver, as it is put on the bobbin, a sufficiently cohesive tension, by making the ordinary tube with the two holes for the sliver to pass through some distance apart, by which the sliver is passed in a spiral direction from one hole to the other, either half round, wholly round, or more than once round.

BROOMAN, R. A. *Improvements in the manufacture of boots and shoes and other like articles.* (A communication.) Dated Nov. 11, 1856. (No. 2651.)

This consists in uniting the "uppers" to the soles without stitching, by means of gutta percha. Holes are punched in the "uppers," and also in the outer sole; a sole of gutta percha is interposed, heat and pressure applied, whereby pegs, rivets, or pins will be started out from the gutta percha and into the holes punched.

LEADBETTER, J. *Improved means of obtaining motive power.* Dated Nov. 11, 1856. (No. 2652.)

The inventor employs a wheel, on the shaft of which are fixed by screws a series of bow springs or crossed levers, bearing against the outer ends of the jointed levers, &c.

CLOSSMANN, F. F. *Obtaining alcohol from certain substances not hitherto used for that purpose.* (A communication.) Dated Nov. 11, 1856. (No. 2653.)

Nuts may be used, by preference dried. After being deprived of the shell, they are ground and put in a boiler, with a sufficient quantity of water to produce a condition suitable for fermentation. Yeast or other fermenting matter may be added. When the fermentation is complete the distillation may be effected in the usual manner.

HODGE, P. R. *Improvements in the manufacture of felted cloth.* (A communication.) Dated Nov. 11, 1856. (No. 2654.)

The object here is to strengthen and solidify the bat, or ultimate cloth, breadthways, and give to it in the nature of a weft a like tension, breadthways, which felted cloth at present possesses lengthways, and the invention consists of improvements upon William's patent, dated Feb. 1840.

COLLETT, H. *Improvements in machinery for mowing and reaping.* Dated Nov. 12, 1856. (No. 2663.)

A frame is mounted on two wheels, one on either side, and a fore wheel is also used. A vertical axis is employed with cutting blades fixed to the lower end of the shaft. The cutter or shaft is put in motion by means of another axle by toothed wheels. The driving axis receives motion by hand from a cranked handle.

PROVISIONAL PROTECTIONS.

Dated June 5, 1857.

1586. John Jordan, of Liverpool, engineer and iron ship builder. Improvements in the construction of iron ships or vessels.

Dated June 11, 1857.

1636. George Farrell Remfry, of Riches-court, Lime-street, merchant. An improved apparatus for supporting, protecting, and propelling the human body in water.

Dated June 13, 1857.

1661. John King, of Glasgow, manufacturer. Improvements in the manufacture or production of collars, cuffs, and similar articles of ladies' dress.

Dated June 16, 1857.

1684. John Fowler, jun., of Cornhill, Robert Burton, of Maberley-terrace, Ball's Pond-road, and Thomas Clarke, of St. James's-place, Hackney-road. Improvements in the construction and arrangement of locomotive and other carriages, to facilitate their movement on common roads and other surfaces.

1686. Joseph Ellis, of Brighton. Improvements in apparatus to be used for decanting wine and other liquids, and for drawing corks from bottles.

1688. Richard Goulding, of Bonner-road, Victoria-park. Improvements in the extraction of gold and silver and other metals.

Dated June 17, 1857.

1690. John Smith, of Oldham, manufacturer. Improvements in the manufacture of woven fabrics.

1691. William and Henry Hodgson, of Bradford, York, machine and tool makers. An improved lubricator or oiler by means of force pumps or valves.

1692. Salomon Sturm, optician, and Henry Emile Bour, gentleman, both of Paris. Improvements in optical lenses and in machines for manufacturing the same.

1696. Gustave Marqfoy, engineer, of Bordeaux, France. Improvements in actuating railway signals.

1698. Frederick Ransome, of Ipswich, engineer. Improvements in moulding plastic materials.

1700. Henry Hibbert, of Salford, engineer, and Henry Richardson, of Manchester, manufacturer. Improvements in finishing or polishing yarns or threads.

Dated June 18, 1857.

1702. Thomas Lowell Ralph, and Thomas Lowell Ralph, jun., of Birmingham, metal rollers. An improvement or improvements in the manufacture of metallic tubes.

1704. Edward Sykes, and Matthew William Crawford, of Glossop, tallow chandlers. Certain improvements in the construction and arrangement of the pans or vessels, and the furnaces and flues, to be employed for the purposes of soap boiling, tallow-melting, bone boiling, dreg boiling, and other similar offensive processes.

1708. Horace Hollister Day, of New York, India rubber manufacturer. Improvements in preparing and vulcanizing India rubber, gutta percha, or other analogous gums. A communication.

Dated June 19, 1857.

1712. Simon Pincoffs, of Manchester, manufacturing chemist. Improvements in treating madder, munjeet, or any of their preparations.

1714. Joseph Hill, of Mount Pleasant, Durham, roll turner. Improvements in the permanent way of railways.

1716. Herman Jaeger, of Ludgate-hill, gentleman. Improvements in looms for weaving. A communication.

1718. John Dunnell Garrett, of Saxmundham, Suffolk, agricultural implement maker. An improved construction of horse-hoe.

1720. Robert Rennie, of Netherwood, Dumbarton, N.B., contractor. Improvements in self-acting trap doors for mines.

Dated June 20, 1857.

1724. Samuel Fox, of Deepcar, Sheffield, umbrella manufacturer. Improvements in fly presses.

1726. Samuel Fox, of Deepcar, Sheffield, umbrella manufacturer. Improvements in the manufacture of umbrellas and parasols.

1730. Joseph White, of Coventry, watch manufacturer. Improvements in escapements for chronometers and other time keepers.

1732. William Rothwell Lomax, of Albion-road, Hammersmith, civil engineer. Improvements in governors and pressure gauges.

1736. James Gascoigne Lynde, of Great Queen-street, Westminster, civil engineer. Improved means for detecting and preventing the waste of water in cisterns.

1738. George W. La Baw, of Jersey, United States. Operating the sails of vessels from the deck by means of vertical shafts.

Dated June 22, 1857.

1739. Peter Armand Lecomte de Fontainemoreau, of London. An improved propeller. A communication.

1740. William Edward Newton, of Chancery-lane. Improved machinery for cutting files. A communication.

1742. Sir Francis Charles Knowles, of Lovell-hill, Berks, Baronet. The manufacture of aluminium and of certain reagents to be used therein.

1746. William Knapton, of the Albion Foundry, Monk-bar, York. An improved machine for drilling holes in metal and other substances.

Dated June 23, 1857.

1747. Thomas Cooper Bridgman, of Bury St. Edmunds, Suffolk, chemist. Improvements in the construction of screens, riddles, or sieves.

1749. Richard Shaw, of Holme-lodge, near Burnley, cotton spinner, and John Robinson, of Lower House, near Burnley, manager. Certain improvements in machinery for preparing cotton and other fibrous materials.

1750. Duncan Proudfoot, of Glasgow, merchant. Improvements in drying and preparing garancine.

1751. James Hinks, of Birmingham, and James Syson Nibbs, of Handsworth, Stafford, manufacturer. Improvements in securing and liberating the corks or stoppers of bottles, and in the construction of the necks of bottles, for facilitating the securing and liberating of corks and stoppers.

1752. Daniel Evans, of New Town, Stratford. Improvements in locomotive and other furnaces, and in heating water to be supplied to steam boilers.

1753. Richard Archibald Brooman, of 166,

Fleet-street, London, E. C., patent agent. Improvements in breech-loading fire-arms. A communication.

1754. Joseph Scipion Rousselot, of Paris, civil engineer. An improved method of obtaining motive power, and engine for applying the same.

1755. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. An improved method of engraving and of copying figures, patterns, and other devices. A communication.

1756. William Edward Newton, of Chancery-lane. Improvements in generating or obtaining motive power. A communication from W. M. Storm, of New York.

1757. Edward Woolley, of High-street, Marylebone. An indicator for registering the names of persons occupying chambers and other apartments or offices, and for signifying whether such persons are in or out and at what time they will return.

Dated June 24, 1857.

1760. Charles Herault, of Paris, gentleman. Improvements in apparatus for producing aërated waters. A communication.

1762. Charles Fréderic Vasserot, of Essex-street, Strand. Improvements in the permanent way of railways. A communication from J. C. Durand, of Marseilles.

1766. Alexander Parkes, of Birmingham, practical chemist. Improvements in coating metals with other metals.

1768. Charles Sanderson, of Sheffield, merchant. Improvements in the manufacture of railway bars, girders, and other articles requiring great strength and stiffness to resist pressure, concussion, or strain.

1770. Joseph Exley, and John Ogden, of Leeds, engineers. Improvements in furnaces or fire places for the prevention of smoke.

1772. John Henry Johnson, of Lincoln's-inn-fields. Improvements in apparatus for testing the strength of materials. A communication from C. Lowthorp, of Trenton, U. S.

1774. Richard Archibald Brooman, of 166, Fleet-street, London, E. C., editor of the *Mechanics' Magazine* and patent agent. An improved composition or polish for maintaining the brilliancy of varnished or patent leather. A communication from Dollier Frères, of Paris.

Dated June 25, 1857.

1777. John Talbot Pitman, of Gracechurch-street. Improvements in machinery for making wood screws. A communication.

1779. William Green, of Ebury-street, Pimlico, gentleman. The letter announcer.

1781. Josiah Wright, of Ernest-street, Alfred Wright, of Bayham-place, and Francis Roberts, of Bayham-street, Saint Pancras. Treating the rhubarb plant, to render its fibres applicable to the manufacture of paper, and the juice thereof to the manufacture of wine and spirits.

1783. John Edward Ingham, of Bradford, and Benjamin Ingham, of Halifax, York, dyers and finishers. Improvements in preparing worsted yarns for dyeing.

1785. Antonio Pelez, of Southampton-buildings, London. A new composition for the manufacture of imitative stones. A communication.

1787. William Palmer, of Brighton. Improvements in watering pots, garden engines, and other apparatus for watering surfaces.

1789. William Price Struvé, of Swansea, civil engineer. Improvements in miners' safety lamps.

Dated June 26, 1857.

1793. John Lloyd, of Langefui, Anglesea, M.D. Improvements in utilizing and deodorizing sewage matters of dwelling-houses and other places, and in apparatus to be used in connection with the same.

1797. Benjamin Nicholls, of Manchester, cotton spinner, and Samuel Ledward, of the same place, mechanic. Improvements in mules for spinning.

1799. Francis Watkins, of Victoria Works, Smethwick, near Birmingham. Improvements in the manufacture of screw nuts. A communication from R. H. Cole, of St. Louis, U. S.

1801. Bennett Johns Heywood, of Leicester-square, gentleman. Improvements in the manufacture of India rubber goods.

Dated June 27, 1857.

1803. Jonathan Preston, of Pendleton, engineer. Improvements in apparatus for regulating the pressure of steam and other fluids.

1805. Charles Thurber, of Worcester, United States. An improved kaligraph or writing machine for writing and similar purposes.

1807. Richard Howland, of London. Improvements in the construction of mangles.

1809. Arsène Auguste Olivier, of Paris, civil engineer. Improvements in treating or preparing and winding silk from the cocoon, and in apparatus for the same.

1811. John Carter and Brook Hodgson, of Halifax, York. Improvements in weaving carpets and other fabrics.

1813. James Biggs, of New Oxford-street, papier maché manufacturer. A portable folding perambulator, which is so constructed as to occupy less space than any that has hitherto been invented.

Dated June 29, 1857.

1815. Samuel Nye, of Wardour-street. Improvements in mills for grinding coffee, pepper, spices, and other substances.

1817. Juan Pattison, of Moorgate-street, engineer. An improved rotatory pump.

1819. John Forster Meakin, of Baker-street, Portman-square, upholsterer. Improvements in carriages for children, commonly called perambulators, and applicable to carriages for invalids.

1821. John Lyon Field, of Lambeth, and Charles Humfrey, jun., of Camberwell, candle-makers. Improvements in the manufacture of candles.

1823. William Maltby, of Grove-hill, Camberwell, gentleman. Improvements in the mode of extracting ammonia and other compounds from gas, gas liquor, sewerage, and other substances.

Dated June 30, 1857.

1825. Thomas Hardcastle, of Bradshaw, near Bolton-le-Moors, printer, dyer, and bleacher. A machine for doubling, winding, plaiting, and measuring cotton and other fabrics.

1827. William Parsons, of Brighton, carpenter and joiner. Improvements in fastenings for windows and casements, and for other similar purposes.

1829. Andrew Spottiswoode, of James-street, Buckingham-gate. Improvements in machinery for compressing artificial fuel and other substances.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," July* 14*th*, 1857.)

614. W. Brown. An improved mode of preparing tapes for the market.

616. T. Gray. Improvements in separating vegetable fibres from mixed fabrics.

619. J. Banks. A new description of life preserver, adapted also to the preservation of property.

620. W. Leuchars. Improvements in locks for travelling bags, portfolios, despatch boxes, and such like depositories.

621. G. Danré, P. F. V. Mouillard and P. A. Mercier. An improved method of, and apparatus for, heating by gas.

631. G. Ralston. Improvements in fire-arms, and in balls or projectiles. A communication.

633. W. Hartley and T. H. Farrar. Improvements in looms.

638. J. Stephens. Improvements in paint brushes and in similar kinds of brushes.

650. T. J. Thompson. Improvements in the construction of gasometers, whereby they are rendered applicable to lighting railway carriages.

653. J. K. Cheetham and T. Southworth. Improvements in the use or application of certain substances for sizeing or finishing yarn or thread, also applicable for sizeing or stiffening woven and other fabrics.

655. R. A. Coward. Improvements in screw or submerged propellers. A communication.

660. G. Danré, P. F. V. Mouillard, and P. A. Mercier. Improvements in carbonizing or distilling wood, peat, oil-cake, coal, and other substances, for the production of gas for lighting, in carburetting or increasing the illuminating effect of and in compressing gas, also in the apparatuses employed for such purposes.

675. C. Sharp. A new or improved manufacture of ships' thimbles and other metallic fittings used for rigging and sails and rope gearing in general.

686. C. H. J. W. M. Liebmann. Improvements in the purification of water and the preparation of the materials requisite for the process. A communication.

689. A. V. Newton. An improved construction of rudder. A communication.

718. W. E. Newton. Improvements in the process and apparatus for tanning. A communication.

720. E. Berger and J. E. Matile. Improvements in machinery for beating and brushing carpets.

743. N. J. Amies. Certain improvements in machinery or apparatus for polishing and finishing yarns or threads.

770. H. Armistead. An improved "picker" to be used in power looms for weaving.

784. N. J. Greenwood. Improvements in spinning mules and slubbing machines.

791. W. Moxon, J. Clayton, and S. Fearnley. Certain improvements in looms for weaving, which said improvements are particularly applicable to looms for weaving carpets and other looped or piled fabrics.

793. W. Banks and J. Banks. Certain improvements in machinery or apparatus to be employed for washing, scouring, or bleaching cotton, linen, and other textile fabrics.

811. J. Sherar. Improvements in oil and spirit lamps by the formation of burners obviating shadow.

837. W. Somervail. Improvements in the treatment or preparation of fibrous materials for being spun.

972. J. G. Hunt. Improvements in fences and gates.

1019. J. Matthews. A new or improved vat to be used in the manufacture of paper.

1040. A. E. Schmersahl. Improvements in treating bones for the purpose of obtaining gelatine, size, or glue, and in obtaining certain useful products from such treatment.

1208. J. Bottomley, C. Hodson, and W. Fielden. Improvements in mules for spinning.

1363. G. Crawford. Improvements in pianofortes.

1375. I. Whitesmith and W. Whitesmith. Improvements in weaving.

1377. D. Carter. Improvements in machinery or apparatus for cleansing the waste of woollen or other fibrous manufactures, or for recovering the wool or other fibres from such waste substances or materials.

1419. G. Sharp and W. Elder. Improvements in hammers and machinery for forging iron and other substances.

1480. R. J. Hendrie, jun. An improvement in steam boiler and other furnaces.

1535. G. Hornsey. Improved apparatus for the engine-rooms of steam-vessels, for communicating signals and orders from the captain on deck to the engineer or attendant below.

1547. S. Hoga. An improvement in coating the surfaces of the cells of galvanic batteries and also the surfaces of crucibles.

1566. R. A. Brooman. Improvements in gas burners. A communication.

1608. I. Whitesmith and W. Whitesmith. Improvements in weaving.

1691. W. and H. Hodgson. An improved lubricator or oiler by means of force pumps or valves.

1695. F. Warner. Improvements in supplying water to water closets and other vessels.

1714. J. Hill. Improvements in the permanent way of railways.

1723. E. V. Gardner. Improvements in the means employed for burning fuel and in the distribution of heat.

1742. Sir F. C. Knowles. The manufacture of aluminium and of certain reagents to be used therein.

1754. J. S. Rousselot. An improved method of obtaining motive power, and engine for applying the same.

1755. R. A. Brooman. An improved method of engraving and of copying figures, patterns, and other devices. A communication.

1770. J. Exley and J. Ogden. Improvements in furnaces or fire places for the prevention of smoke.

1772. J. H. Johnson. Improvements in apparatus for testing the strength of materials. A communication.

1807. R. Howland. Improvements in the construction of mangles.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners'-office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1512. George Arthur Biddell.
1513. Paul François Aerts.
1524. Oliver Maggs.
1526. John Knowelden.
1531. William Armand Gilbee.
1543. John Baptist Chauvet.
1546. William Bishop.
1562. George Wade Kelsey.

LIST OF SEALED PATENTS.

Sealed July 10, 1857.

104. Alfred Bower.
106. Walter Thurtell, jun.
107. William Gossage.
109. Michael Potter.
116. John Coope Haddan.
121. David Hamilton Fowler.
129. George Bedson.
243. John Elce and John Hewitt.
285. John Allin Williams.
313. James Taylor.
757. John Millar.
1119. Amory Fairbanks Sherman.
1151. Agostino Gatti.

Sealed July 14, 1857.

128. Julius Homan.
135. Henry Henson Henson.
182. Samuel Neville.
224. John Fortescue.
228. Richard Archibald Brooman.
230. William Henry Brown.
826. Charles François Léopold Oudry.
1244. Benjamin Chew Tilghman.
1282. George Tomlinson Bousfield.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

W. Carroll.—Had your letters been deemed worthy of, and suitable for insertion, they would have appeared. We really cannot undertake to give a printed reply to each of the numerous notes we receive.

R. Twiss, Knockcairn. Your suggestions are not, in our opinion, important. The recognised laws of geometry will never be proved wrong by rolling cylinders over surfaces. It must be remembered that the law you speak of is not *assumed*, but *demonstrated*.

480, *C.*—We must delay our reply for a week.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris: Puckle and Kendrick, Birmingham; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburg.

Mechanics' Magazine.

No. 1772.] SATURDAY, JULY 25, 1857. [Price 3d

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street.

THE AMERICAN BREECH-LOADING GUNS PURCHASED BY THE GOVERNMENT.

Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

Fig. 5.

THE AMERICAN BREECH-LOADING GUNS PURCHASED BY THE GOVERNMENT.

A discussion recently took place in the House of Lords respecting the purchase of certain American breech-loading guns by our Government, about which very little seems to be known. The following information will therefore be of interest to the public.

In 1853 an American gentleman, Mr. Eastman, obtained a patent for an invention, in which the breech of breech-loading guns is secured to the barrel by means of a screw on both breech and barrel, portions of each screw being cut away to allow the breech to enter the barrel, a portion of a turn of the breech then securing the two together. The invention essentially consists in a method of unscrewing the breech from the barrel and withdrawing the same, of turning up the breech so as to bring its chamber into a vertical position for loading, and then returning the breech into the barrel and locking the two together, these motions being performed through the intervention of appropriate cams, catches, and springs, by the motion of a single lever worked by the hand of the gunner.

His invention embraces a very important application of the arrangement of screw-threads by which the breech and barrel are connected. This consists in placing the joint before the charge, so that the breech-piece really becomes a piece of ordnance in itself. The difficulty experienced in obtaining a tight joint in ordinary breech-loading guns is thus got rid of, for the gases generated by the explosion of the charge do not reach the joint until their expansive force has been very considerably reduced. This result is of the first importance, and constitutes the basis of all the other improvements of the inventor.

The six guns which have recently been landed at Woolwich Arsenal, and which were the subject of the conversation in the House of Lords, are constructed with this improvement, but the cams, catches, and springs, &c., are dispensed with, and motion is communicated to the parts as follows: the partial rotation, by which the threads of the breech are turned clear of those in the barrel, is effected by a handspike or lever passed through a hole in the cascabel; the withdrawal of the breech is produced by means of racks and pinions, placed one on each side of the gun; and the elevation of the fore-end of the breech to receive the charge is produced by the handspike in the cascabel, the breech being very nearly balanced on the pinions or rollers at the side, and therefore easily moved from a horizontal to a vertical position. The reverse operations restore the breech, when charged, to its place in the barrel. These arrangements have been adopted in the guns now at Woolwich on account of their extraordinary size, their weight being 16½ tons.

The committee of officers, whose duty it is to test and report upon improved ordnance, have not completed their experiments with the guns in question, but we are informed that results of a very extraordinary character were long since obtained with guns essentially of the same kind, and were deemed so satisfactory that Lord Panmure remunerated the inventor and purchased his patent, although, with a clumsiness which is but too common in Public Departments, the remuneration was made to appear as if it were paid simply for the purchase of the patent, whereas it was of course intended in part to reimburse the inventor for his pecuniary outlay, and in part to compensate him for the labour expended in the introduction of his invention, and the establishment of its merits. We mention this, because the manner in which the expenditure is formally recorded affords room for unnecessary cavil, and, indeed, might occasion much misapprehension even in the minds of persons well affected towards the Government.

We will now describe the guns at Woolwich more fully by the aid of the annexed engravings.

If a male screw, *a*, fig. 1, is cut upon the end of the breech, and a corresponding female screw, *b*, fig. 2, is made on the interior of the barrel, and these screws are then marked off into six sections, and the threads upon every alternate section in each are cut away, as at *c c′*, it will be evident, that by turning the breech so that those sections, *a*, of the male screw upon which the threads remain stand opposite to the sections, *c′*, of the female screw from which the threads have been cut away, the breech may be readily

slipped into the barrel.* If now the breech be made to perform a sixth of a revolution, those sections, *a*, of the male screw upon which the threads remain will engage with the screw sections, *b*, of the female screw, and the two parts will be drawn firmly and tightly together. This explanation is sufficient to show how the breech and barrel are connected.

Fig. 3 is a plan view, and fig. 4 a side elevation of one of the guns as seen at Woolwich. A is the breech; B, the barrel or body of the gun; C, a collar round the breech; D, the trunnions. The collar, C, has connected to it the pinions, *d d*, which run on the racks, *e e*, these latter being connected firmly to the sides of the gun. The breech, A, revolves through a portion of a revolution within the collar, C, its motion being limited by the stops, *s s*. *f* is the cascabel, which has formed in it the hole, *g*, to receive the end, *h*, of the lever shown in fig. 5. *i i*, are studs or centres, on the pinions, *d d*, to receive spanners or levers, by which the pinions are moved along the racks, *e e*. The action is as follows: Supposing the piece to have been discharged, the lever, fig. 5, is placed in the hole *g*, of the cascabel, and the breech, A, thereby rotated through the necessary distance to disengage the threads. The pinions, *d d*, are next put in motion, and the breech, A, thereby carried back clear of the barrel, B. The rear end of the breech is finally depressed, so that the fore end is carried up clear of the barrel to allow the charge to be inserted. This being done, the operations are reversed, and the piece thus prepared for firing.

The entire weight of one of the guns is, as we have said, 16½ tons. The breech alone weighs 5 tons, but is nevertheless easily and rapidly worked by four men. The length of the bore is 12 feet, and the diameters of three of them 8½ inches, and of the other three 6¾ inches. They are all rifled with five grooves of the same breadth as the stops between them. They are made from the finest American charcoal iron, and so constructed that the bore may be greatly enlarged, for experimental purposes, at a small expense. The shot to be fired from them are elongated, and weigh 170 lbs. each. We hope before long to give the results of the trials shortly to be made with these guns; in the meantime we may state, that it is anticipated that the range and penetration obtained with them will exceed those obtained with ordinary cannon as much as the range and penetration of the Minié rifle shot exceed those of the ordinary musket bullet.

NEW WORKS OF DEFENCE AT GOSPORT.

The Government have just completed the purchase of a tract of land, encompassing the town of Gosport, at a distance of about two miles from it, for the purpose of establishing upon it a new line of fortifications. The land purchased is a broad belt of about three hundred yards in width, and extends from Frater's Point, at the upper part of Portsmouth Harbour, to the sea in the neighbourhood of Stokes Bay. In its direction it bisects the Fareham-road a short distance to the northward of the hamlet of Brockhurst, then crosses the Itchfield-road to the eastward of the picturesque Chapel of Rowner, from which point it bears away towards Grange, part of which estate it includes, and terminates, as before stated, at the sea at the west horn of Stokes Bay, near which, and included in the Government purchase, is the new fort already built, named Gower, after the estate of Leveson Gower, Esq., which has also been purchased.

Some of the circumstances connected with the purchase transaction of the land in this neighbourhood are painfully ridiculous. About fifty years ago, the necessity of strengthening the outlying fortifications at Gosport became apparent to the military engineers, and purchases of land were made about Browndown and in the locality of Gower Fort for this purpose, on which occasion about £100 per acre were paid for the property. The land, however, was not turned to account for fortifications. With the exception of a few small earthworks, nothing was done; and in the office of the late Sir Hussey Vivian, the greater part of the Government land was sold, and in many instances did not realize more than £10 per acre. On the occasion of the last purchase of the same land, which had been thus bought and sold on such unfavourable terms, Government paid £240 per acre for it, thus making the public a loser by about £300 per acre on their transactions!

It has not yet transpired what will be the extent and character of the fortifications which are to be erected on this land. At present the only movement has been an order to clear away all the hedges and other obstructions, and turn it into grass land.

Rumour states that a canal is to be cut from the upper part of the harbour to the sea at Stokes Bay, for the purpose of allowing the passage of gun-boats through.

* Figs. 1 and 2 are intended to illustrate the internal arrangement only, and are not by any means designed to represent the proportions of the parts.

But it can scarcely be supposed that so much expense would be incurred, when by the continuation of the Stokes Lake through the valley at its head, which has evidently been recovered from the lake, and which terminates at a very short distance from the sea, a canal could be formed at a very much smaller cost. The circumstance, too, of the Gun-boat Dockyard being already on this lake is more favourable for such an arrangement, as, in the event of a gun-boat flotilla being required for a flank movement, they could execute the same much more quickly from this point than if they were to make the circuit of the harbour.

The forts already finished and in progress on this intended line of fortifications consist of the strong bastion redoubt before alluded to, called Gower Fort, and another in course of construction at Frater.

There is no doubt but that all this is a move in the right direction. The Gosport side of Portsmouth Harbour has long been a source of anxiety to military engineers, as hitherto the simple line of earthworks surrounding Gosport has been quite inadequate to bear any serious pressure from an enemy, who, having once possession of that side of the harbour, would have the dockyard entirely at command. The contemplated extended works will, however, give great security to this point, and the public may be congratulated on the undertaking.

We remember, some time since, when our relations with our French neighbours were not quite so satisfactory as they are at the present time, and when military officials were looking anxiously at our coast defences, proposing that two line-of-battle ships should be lightened, and one floated up each of the creeks which run inland for some distance to the north and south of Gosport, and that heavy guns should be placed on their upper decks, which would enfilade the entire face of the earthworks of Gosport, making it impossible for an enemy to advance without regular siege approaches. These ships, from being isolated, would be difficult for an enemy to deal with.

Before closing these remarks we must refer again to the gun-boat establishment on Stokes Lake. The arrangements which at present exist for disposing of this new arm of our naval defences is to haul them up on a slip, from which they are transferred to a kind of huge railway carriage or truck, which moving laterally deposits the gun-boats into sheds constructed for the purpose. By the present arrangement, the tide is allowed to flow and ebb into and from the lake, and the consequence is that the process of hauling up the gun-boats, and of course launching them again, can only be performed at high water, and at low neap tide there is not sufficient water even for this. Now, the entrance to this fine lake is narrow, and, at the point where Haslar Bridge crosses it, is admirably adapted for a dam, which, by being thrown across, and furnished of course with gates, would transform this now almost useless creek into one of the finest wet docks in the kingdom, and which would not only enable the gun-boats to be launched or hauled up at any time, but also provide a safe and out-of-the-way place for any vessels of this description now blocking up our principal harbours.

FURTHER CONSIDERATIONS ON THE NATURE OF SOUND.

BY HORATIO PRATER, ESQ.

As when the ears, mouth, and nostrils are stopped by the fingers, and the head also covered, loud sounds still continue to be heard, and that, too, even when the doors and windows are closed, I infer, as I did formerly (*Mechanics' Magazine*, May, 1844), that sound must be caused by an imponderable and invisible ether, and not by the undulation of the air, as commonly stated. I also in *this* essay go further than in the preceding, and affirm that as the ether in question passes through *very dense solids*, human flesh and bones, walls, windows, &c., it must be of a more *penetrable nature*, and probably *far* less dense than light, or the ether said to produce light. It must consequently be DIFFERENT from light. There are therefore at least TWO DIFFERENT imponderables always, or generally, in the air.

Taking Mrs. Somerville's statement as correct (though the experiment wants repeating and *varying*) that the sound of a bell cannot be heard *in vacuo*, we must then admit that air is necessary to *begin* the undulations of this ether; or indeed that it is necessary for *the very existence* of this ether. If this latter supposition be correct (as air is necessary for all life), it will make us approach to believing in a sort of vitality of such ether. More particularly is this the case when we consider the strange phenomenon of SYMPATHETIC sounds, and Mrs. Somerville's statement that "a tuning fork sounded on a piano acts only on certain sympathetic cords, viz., those which can execute the same vibrations or motions."—(*Connection of the Physical Sciences*, p. 169; also Prof. *Müller's Physiology*. Translation, p. 1226.)*

* Dr. H. Reinsh has very lately found that when a light magnetic needle is suspended above a violin, and the catgut string thrown into vibration by drawing the bow across it, a deflection of the needle, amounting to 90°, often takes place

Such are the *additions* to my views on the nature of sound, which were rather unpleasantly for myself almost forced upon me by my occupying, in Rome, last winter, chambers so contiguous to a coachmaker's, that I was induced to try numerous means of diminishing the noise of the loud knocking; but, as stated at the beginning, could not completely, though my ears, nostrils, and mouth were kept well pressed against; and, I may add, the sound had also to pass through two doors or walls, for my bedroom was at the back, and the noise was in the front of the house.

I exhort my readers to experiment for themselves on this subject, for formerly sound was said to be the motion or vibration of the air. Now, I observe, in a work published by Messrs. Longman in 1855, it is rather dogmatically stated, "Thus sound *is* motion." No doubt, in all probability sound cannot be generated *without* motion; but the philosopher who says it *is* motion, thinks the case so clear that he states it by way of showing how we may conceive light, heat, and electricity to be also only *different kinds of motion*. As the great object of his book is to show the above three agents *may be* only motion, he starts by assuming the case of sound as *proved*. Now I must beg to deny the certainty of such an assertion, and request my readers to observe the *vagueness* of writers generally on this subject, one making sound to be the motion of *air*, another (as the author in question) the motion of even *grosser or more ponderable** atoms, alluding to the fact that by placing the ear against *a long* piece of metal, struck at one end, that the sound is heard at the other.

Now although it is said savages in the same way, by placing the ear on the earth, acquire increased power of hearing noises at a distance, still all this by no means shows that sound can be nothing else in such cases than the motion of atoms; for it is surely easier to consider that a blow on the metal or the earth should set a *very light* ether in motion, and make its *waves* run quickly from one part to another, than that it should set the *atoms themselves* in motion, and more, should make these atoms communicate their motion so quickly to *hundreds or thousands* of others along the whole line in which the sound is heard. But I think I may go farther, and allude to the observations and experiments with which I opened this essay, as proving that sound in such circumstances *cannot be merely the vibration of ponderable*, and also mark of (so called in common language) FIXED atoms, though it might possibly in the case of the iron bar.

after five or six strokes—"greater, the greater the tension of the string and the purer the tone." (March, 1857.) Experiments of this description should also be made in vacuo when possible, in order to be sure the undulations *of air* do not produce the motion. If the vibrating string is covered with fine copper wire, strange to say, he found no effect produced.

* Professor Müller says, "Sound is propagated in water with about 4 times, in iron 10½ times, and wood 11 times greater velocity than in air" (p. 1228). Thus it moves more quickly through solids than through fluids; yet, surely, this could not be, were it the motion of *material* atoms. Müller, at p. 1240, has also, I observe, given some original experiments, showing that when he plugged his ears well, he could hear sonorous vibrations produced in water *much* better by the aid of a glass tube, or even of a wooden rod held in contact with the sounding body and the plug in the ear, than through the medium of the air only.

Our best writers on physics have, at least since Newton's time, admitted the probability of his *universal all-pervading ether*. In the present paper I have ventured to give some reasons for supposing *two** such imponderables; but allowing I have not proved my point, even on Newton's idea of one ether only, the vibration *of this*, and not of the particles of matter, is surely the far most probable theory of sound. If the atoms of the wall of a house were as easily thrown into vibration, as some of our modern philosophers believe, surely the MERE SOUND of a few cannons should make the house itself fall! For myself, then, I prefer humbly to walk in the track of the Newtonian ether, and to endeavour to discover other ethers and forces by reason and observation only, when (as in this case) experiment can scarcely be made to come to our assistance.

We all know when we close our eyelids we cannot see *at all;* but by the above observations I have shown that, though we close not only our ears, but also our nostrils and mouth, we can still hear; I put it, then, to any impartial man, whether the common theory on this subject is correct; but especially should he remember *sympathetic* sounds, above referred to, and study these more in detail.

Since the above was written, I find that the celebrated zoologist, Lamarck, wrote many years ago an Essay "Sur la Matière du Son" (*Journal de Physique*, vol. xlix. p. 397), which I have not seen, but recommend to the student's attention. Of course, where our views agree he has the priority.

As we can hear a noise through the ceil-

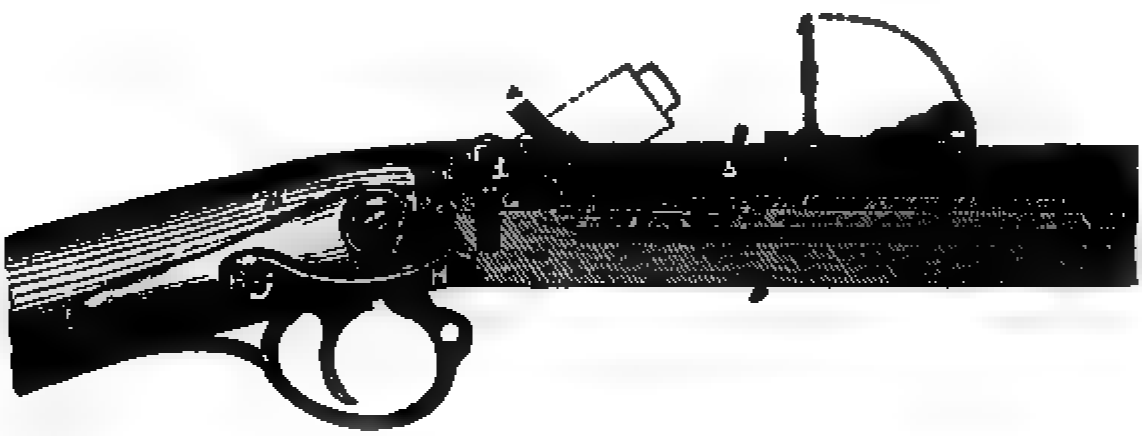
* However, as light in falling on what are called opaque substances may *possibly* be absorbed, or in modern philosophic language "converted" into other modes of force (the so-called latent light or heat), I do not insist on having proved the existence of more than one kind of ether (which I conceive previously had not been done). It was merely an ingenious supposition. The view of one ether is simpler; but there *must be* two, if this one ether is not of a convertible nature.

ing above us, perhaps still more easily than one below us, it is clear that sound (like heat and light) seems to move with equal ease *downwards*, though by its nature more prone possibly to ascend. But it seems more analogous to heat in its great *permeating* power, for, like that, it passes more or less through *all* substances transparent or opaque; whereas, light passes only through transparent, and electricity, generally speaking, only through opaque media. This analogy between heat and sound is curious in reference to the sympathy of the flame of burning hydrogen with certain sounds.

CAPTAIN HARRISSON'S PATENT BREECH-LOADING FIRE-ARMS.

Captain G. A. Harrisson, of H. M. 79th Highlanders, has patented an excellent arrangement of the parts of breech-loading fire-arms, represented in the accompanying engravings. Fig. 1 is a view partly in section of as much of a musket as is

Fig. 1.



sufficient to exhibit the improvements, and fig. 2 is a view partly in section of the breech case and breech bolt. The moveable breech-piece, E, is fitted in a recess at the rear of the barrel, and is capable of backward, forward, and rising motions. The fore end of the breech-piece, E, terminates in a tapered projection, *b*, which slides into and out of a similarly formed recess, *c*, in the rear end of the barrel. The rear of the breech-piece, E, is provided with an ordinary nipple, L, for the reception of a percussion cap, which is fired by a hammer and an ordinary lock. The breech-piece, E, is drawn back by a lever, H, which at the same moment frees a metal wedge, F, at the back thereof. When the breech-piece, E, has been drawn back sufficiently to release the tapered end, *b*, from the barrel, on the lever, H, being further drawn back, a spring, *e*, raises the fore end of the breech chamber (as shown in fig. 2, and in dotted lines in fig. 1), and the same is kept raised by the spring, and in this position the chamber is prepared for the reception of its charge. After the charge has been inserted, the fore end of the breech-piece is depressed by the finger or thumb, when the lever, H, is returned to its seat; and in being so returned it simultaneously pushes the breech-piece, E, forward until the tapered end, *b*, is engaged and driven home into the rear end, *c*, of the barrel, and brings up the metal wedge, F, at the back of the breech-piece, and before the rear end of the casing, E, and thus a solid abutment is obtained to resist the effect of the discharge. Should any wear take place in the tapered surfaces at the front of the breech-piece, the wedge, F, at the back, will compensate for the same and always keep it tight.

D is the stock in which the barrel is secured by keepers and by a hooked projec-

Fig. 2.

tion, D', formed on the rear end of the breech-case, B. This hooked projection takes

into a hole or recess formed in the ordinary manner in a piece of metal which is set in, and secured permanently to the stock. The breech-piece, E, is formed as shown at *b*, and takes into a recess of a corresponding shape formed in the breech-case, B, at *c*. When charged, the tapered end of the breech-piece is held hard into its recess by a wedge or key, F, which key is jammed into the position in fig. 2. The key, F, when acted upon by the lever, H, is jammed by a projection, *d*, on a disc or boss, G, which is sunk into the breech-piece, and is secured on a spindle, *e*, and turned by the lever, H, the projection takes into and between two teeth formed in the farther edge of the wedge, F, so that as the disc and projection are partially rotated, its effect will be to raise or lower the wedge, F, according to the direction in which the lever, spindle, and disc are turned. The disc, G, has a square hole formed in it, which fits on a square portion of the spindle, *e*, so that when the lever and spindle are turned, the disc is carried along with them; it likewise allows the lever and spindle to be withdrawn from the disc when necessary, and thus releases the breech piece, and leaves it free to be withdrawn. Sufficient spring is given to the lever, H, so that when it is pressed up and held by the pin-catch, *j*, the wedge will always keep the tapered end of the breech properly in its recess, and prevent the escape of gas, and likewise compensate for any slight amount of wear that may take place.

MARYCHURCH AND GRIFFITHS' PATENT HORSE-RAKE.

Messrs. W. Marychurch, agricultural implement maker, and J. Griffiths, engineer, of Haverfordwest, have patented a very useful improvement in the construction of horse-rakes. In these implements, as hitherto constructed, there has been affixed to the frame a series of levers attached to a handle, which, upon being depressed by a man walking behind the rake, raises the teeth in order to relieve them of their load. The improvement consists in an arrangement for working the teeth of the rakes by the forward motion of the implement itself. This arrangement is shown in the engraving, which is a side elevation, partly in section, of a rake with the improvement applied thereto.

A, is the frame of the rake; B are the teeth; and C, the driving wheels. The teeth, B, are hung upon a strong iron bar, D, fitted into the two sides of the frame, and extending about three inches beyond it on one side. To this bar, D, are also attached three or more cranks, E and F; E, being inside the frame, A and F outside, in order to serve as a fulcrum at G to the lever H. The ends of the cranks, E, carry a bar, O, by which the teeth are raised. I is the ratchet wheel fixed to and revolving with the driving wheel, having in its circumference a number of teeth cut and placed about an inch apart, and protected by a cover. The lever H is furnished with tongues, L L, and a curved end, K; the tongues, L L, fall into two of the ratchets, and the curved end, K, pressing against the back of the next tooth, releases the lever from the hold of the wheel. A cord is attached to the lever, H, and carried by the attendant driving the horse; when required to discharge the load, he raises the end of the lever next him, so that the tongues, L. L, fall into the teeth of the ratchet wheel, where they are immediately

secured by the onward motion of the rake and pressed forward, thereby turning the crank, F, and consequently the bar, D, with the cranks E. These cranks then elevate the bar, O, which raises the teeth, as shown by the dotted lines. The teeth having arrived in this position, the back of the next tooth of the ratchet wheel to that in which the last tongue of the lever was engaged, presses against the curved end, K, throws it out of gear, and the teeth fall of their own weight. Into a cross bar which is attached to the frame of the rake is fitted a screw, M, working into a female screw at Q, which is jointed to the shafts P. The shafts are also jointed to the frame of the rack at R R. By this arrangement the frame and the points of the teeth may be set to any inclination when the rake is at work by the attendant turning the handle N.

The patent also includes an improved shoe, shown at S, which is intended to relieve the horse of the weight going down hill. The improved shoe may be applied to all two-wheeled carriages.

ARTIFICIAL MARBLE.

ALABASTER, gypsum, gypsous rocks, and calcareous stones and earths are naturally more or less soft, brittle, tenacious, and compact, and so friable and easily injured or marked that, notwithstanding their apparent beauty, they cannot be used in the arts without being decomposed by the action of fire, and recomposed and prepared for the various purposes to which they are to be applied. The alabaster of Volterra and other gypsums are of little value on account of their friability, and their facility in absorbing dust or other matters, which soils them and renders them of little use. To obviate these defects, and render the above substances hard and serviceable, the Marquis Campana has introduced a method of exposing the alabaster and every other kind of gypsum and calcareous stones and earths to a heat of about 212° Fahr., in order to expel and drive off the watery particles contained in it. The time during which the gypsum must be so exposed will vary with the nature of the material; but experience will soon dictate the precise time to the operator. When sufficiently dried, the gypsum is plunged several times in succession in clear water at the temperature of the atmosphere, or in any other suitable hardening liquid or substance, or composition reduced to a liquid state; and when the operator finds by experience that the plunging has been continued for a sufficient length of time, the gypsum is withdrawn and exposed to the atmosphere to complete the hardening process, which requires from five to thirty days, more or less; after which the gypsum is in a fit state to be polished and treated in all respects similarly to marble, which it will be found very much to resemble. In fact, by operating upon gypsum in the manner described, an artificial marble is produced. In order to colour the gypsum, any suitable colouring material may be mixed with the water in which it is plunged after the drying process; but the colours most preferred are those produced from minerals reduced to a state of solution, some of which—as, for example, sulphates of iron and copper—not only impart colour to the material, but also harden it additionally.

An Italian correspondent has sent to the *Athenæum* some notes on the new process. He says, "The fabric is at San Giovanni, *en route* to Portici. In a large chamber I found specimens of various species of the marble worked into tables, vases, pedestals, and cornices. Porphyry, rosso antico, giallo antico, brocatello, and other marbles were there: so the eye declared, and neither myself nor my friends could have distinguished between them and the real marbles. They were marked by the same 'ring' on striking them, by the same appearance in the internal formation, and by the same high polish on the surface. In fact, we were witnesses of the mode of polishing adopted, which resembled exactly that used for marbles, that is to say, pumice-stone and water in the first instance, and a hard, cross-grained stone, here called 'lavagna,' after. Adjoining the fabric, we were shown the roof of a house which had been covered with this material, and had resisted the heat of two summers and the cold and frost of two winters, yet not the slightest impressions had been made by either. As yet only two fabrics (of these marbles) exist—one in Rome and the other in Naples. In London an imitation has been attempted; but it is limited in its range, not embracing any other varieties than porphyry, giallo antico, and rosso antico, and it is nothing more than a plaster laid over a hard stone, such as lavagna, whereas the Marmoridea is one solid substance."

Specimens of the artificial marble may be seen at the office of this Magazine. The Marquis proposes to dispose of his patent.

THE "TRANSIT."—In the House of Commons last week, Sir Charles Wood, with just pride, directed attention to the fact that the *Transit*, about which he had been so much harassed by the press, had beaten even the admirable *Himalaya* on the voyage to China. The *Morning Herald* now says the *Transit* is the best steam transport in the service—an opinion which was expressed by ourselves in May last.

THE IRON TRADE.

(*From our Correspondent in Wolverhampton.*)

The Leading Features of the Month—The Reduction of the Russian Tariff—Reduction of the United States' Tariff—The Present and Future Influence of these Measures upon the Trade — The Quarterly Meetings—Value and Quantity of Iron Exported—Prospects of the Trade—Tendency of Prices.

THE past month has been one of considerable interest and importance in the history of the iron trade. During it, a measure for which there was a hard fight at Washington, and which occasioned no little interest in our own country, has come into operation. The past month also has seen a reduction upon the tariff of another vast country, whose ports are now open to some descriptions of iron to which before they were shut; and since the last monthly publication of the *Mechanics' Magazine*, the ironmasters have held their customary quarterly gatherings.

So far as the reduction upon the tariff of the United States is concerned, little, if any, benefit, has yet been experienced by the English iron maker. The measure came into operation on the 4th of July, but it has not hitherto had the effect of creating a larger demand than existed before that time; indeed, the specifications received from the United States since that time have not been of the value that they were before it, and the orders by the *Persia*, whose letters, after the quickest passage on record, were delivered on Saturday the 18th of July, formed no exception to that general statement. There is every reason, however, to believe that the influence of the reduction will be most beneficial upon the "fall" trade; and that, in a mail or two, the United States demand will be large.

The alterations in the Russian tariff are not yet fully understood in this country. In the present imperfect state of their information, our makers have not very sanguine hopes of its results. Russia has hitherto to a great extent supplied herself with iron, and this concession is looked upon by some of the export houses more as an attempt to conciliate a portion of the commercial interest here, than as a measure designed either for the benefit of the Russian consumer or the foreign maker. We have nowhere seen the reductions given in English money and English weight. It might not, then, be amiss if we stated that, estimating the exchange at 38, 15 copecs per pood on pig iron is equal to 1*s.* 5*d.* 1-10 per cwt.; that 50 copecs per pood on bars of half an inch thick and upwards, is equal to 4*s.* 9*d.* per cwt.; and that 90 copecs per pood upon plates is equal to 8*s.* 6*d.* 6-10 per cwt. Under the old tariff, pigs were prohibited.

The quarterly meetings have passed off without any alteration being declared by "the trade" in the prices that have ruled that coalition now for at least eighteen months past; the last meeting of the series being held at Dudley, on Saturday, the 18th of July, without any marked amount of animation. As a whole, things were flat; yet it was stated that there was a quiet trade doing at most of the houses; no large number of orders upon hand, it was true, but enough to keep the malleable iron makers in full work until a considerable accession of orders it was confidently anticipated would be received. Whilst the trade rates have been ruled to remain at 9*l.* for bars, 10*l.* for hoops, and 10*l.* 10*s.* for sheets and plates, iron of a good serviceable quality, for most purposes as good as the article customarily sent out by the houses whose names are of celebrity in this branch of commerce, it being sold at at least 20*s.* below the prices quoted above. It is a mistake to suppose that good iron can be obtained only at trade houses. There are establishments that, to a large extent, are deriving more advantage from their name than from the quality of their goods.

The export returns for May—June's returns not having yet been published—show, comparing the first five months of 1855 with the same period in 1857, a gradual expansion of the trade in pigs, and a marked increase in the export of malleable iron. In the first five months of 1855 the quantity of pig iron exported was 127,954 tons against 179,080 during the same period in the present year; the value in 1855 being £428,386 against £700,510 in 1857. Of bars and bolts from January to May 31, 1855, 182,358 tons were exported against 326,993 tons in the first five months of this year; the value on the former occasion being £1,551,002 against £2,836,049 in 1857. The quantity of bars and bolts exported to the United States has in the first five months of 1857 been nearly double the amount returned in 1855. Up to the 31st of May in that year the value of this description of finished iron shipped to the States was £569,302; in 1857 it is set down at £1,103,893. The increase, though not so large, is considerable in respect of all other countries to which manufactured iron is exported. Comparing the total exports of the month of May, 1856, with the exports in May this year, the returns show an increase in the value of the exports of iron for May, 1857, as compared with May last year, of £166,599, the amounts being £1,202,252 in 1856, and £1,368,851 in 1857. The exports of pig iron to the United States were one-third more in May

last year than they were in May this year.

In examining the returns for these figures we were somewhat surprised to see the rapid increase which they demonstrated in the export of machinery. The total for May this year was £387,376 against £197,513, showing an increase of £189,263. Very significant is the fact that, whilst the value of the machinery purchased on Russian account in 1856 was only £4,701, that of May this year was £78,858. The increase in our East Indian demand also was nearly fourfold.

With this latter fact before them, no wonder that the British ironmasters should memorialize the Government not to guarantee a certain per centage upon all capital invested in ironworks in our East Indian territory.

Of the iron trade in the next month the prospects, influenced in great part by the easier condition of the money market and the excellent harvest prospects at home, in America, and upon the Continent, are good; and it is not improbable that prices of both pig and manufactured iron will then be firmer than they are now. In respect of the latter, they may be had at, at least, 1s. 3d. per ton cheaper than they could at the quarterly meetings.

A SUGGESTION FOR STREET RAILWAYS.

Mr. T. Burrows, of Regent's-park, proposes what he designates "An invention for rendering the streets of London more fit to transact business in, and for obviating the noise and obstructions caused by vehicles." The remedy he proposes is to bury the wheels about four feet deep on each side of the principal streets, where rails would be laid to carry the wheels and framework of the carriages above. "To illustrate this more clearly," says Mr. Burrows, "the top of the letter T would show the point of contact for the fixture of the carriages above, and the lower part descending through a rut would connect the framework with the wheels below, after allowing sufficient space for the diameter of the wheels; the passage would then be paved over on iron supports, and the only difference in the appearance of the streets would be a rut or grating to allow the supports to travel in. The passage would likewise serve as a depository for the main piping, which would then be better preserved and more quickly got at for repair. The width of the carriages would be regulated according to the width of the streets they had to be used in, and first, second, and third class carriages should be employed. The third class would be simply a platform for standing on; the bottom of the carriages would be almost level with the kerbstone, so that by having an uniform speed, the bulk of passengers might get off and on without stoppage. To facilitate this, handrails on each side of the street would be necessary at intervals. Horses would still be retained for traction, or if preferable steam could be introduced. The noise of the streets would be very much reduced." He further proposes to apply the method to ordinary railroads. "If this principle could be introduced," he says, "on the railways, three of the causes of accidents would thereby be obviated, for, first, trains would not then leave the rails from over speed, from any casual obstruction, or from any defect in the rails, and the velocity might then be increased with safety. Secondly, persons would not be mangled from the wheels. And, thirdly, the most disastrous cause of accidents—that of trains being run into by a succeeding train, might be obviated by having a trail attached to each train to be dragged half a mile in the rear, and having signals attached, so that in case of a stoppage the signals would then be held up to the eyes of the driver of the succeeding train."

LOWERING BOATS AT SEA.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I have read with much care your article upon Captain Kynaston's method of lowering boats, which was evidently written with like care, and I cannot allow it to pass without comment, first, because I consider it likely to be indirectly productive of serious injury to Mr. Clifford, whose zeal in urging forward his invention is as remarkable as the skill with which he planned it; and secondly, because I consider that Captain Kynaston has somehow been invested with honours to which Mr. Clifford has a just and indisputable claim.

I shall not occupy your space with a comment upon the objections urged by Captain Kynaston against Mr. Clifford's method of lowering boats, because I believe that objections of equal strength might be brought to every conceivable method of effecting the same object. But what I cannot fail to do is, to point out the remarkable resemblance which exists between what is really good in Captain Kynaston's plan, and what is now well known as belonging to Clifford's. The chief feature of each is, I presume, the arrangement for finally liberating the boat from the ship, and this feature is, I am prepared to contend, practically identical in the two cases. Mr. Clifford employs a barrel under the boat's

thwart—Captain Kynaston does the same; Mr. Clifford makes the letting go of the boat dependent upon the letting go of a single rope by one man—Captain Kynaston does the same; Mr. Clifford lets the ends of the pendants slip through holes in the barrel—Captain Kynaston lets them slip off pins in the barrel. In all these points Captain Kynaston's contrivances are either the same as, or what we commonly call, in law parlance, "colourable imitations" of Clifford's; and in these very points his invention chiefly consists.

And now, Gentlemen, a word or two of a more delicate nature. Captain Kynaston is a naval officer and a Commander of the Bath, and therefore a gentleman; consequently I will not, and cannot suppose him to have acted in any respect dishonourably, falsely, or with bad faith. At the same time, I have heard that at Devonport Dockyard there are persons who consider that no one knows better than Captain Kynaston how much Captain Kynaston is indebted for his arrangements to the boats already fitted with Clifford's apparatus. I have heard that Captain Kynaston carefully studied Clifford's plan in that dockyard, and studied also how it might be varied. But I fear you will scarcely approve of these suggestions, and therefore I will not extend them.

I must beg to be allowed to add, however, that Mr. Clifford ought to be held secure from injury by such a scheme as Captain Kynaston's. Mr. Clifford has worked perseveringly for years at his invention; has perfected it at much expense to himself; has tried it scores of times personally in the most unfavourable circumstances; has refused to slacken either his labour or his expenditure until he has seen it adopted to a large extent in every description of seagoing ships; has overcome the immense inertia of professional men, and extorted their unanimous plaudits; and is, I hope, about to reap a reasonable reward for his labours. For the honour and security of inventors, I ask you to lend no countenance to the attempt of any man to strike from the hand of such an individual the just and fair reward which he has within his grasp.

I am, Gentlemen, yours, &c.,

SPECTATOR.

A NEW MOTIVE POWER.—A correspondent informs us that he has succeeded in inventing a new method of obtaining motive power, and an engine for carrying the invention into effect. The materials employed as the source of power are, it is said, cheap and abundant, and the apparatus for applying it easily constructed and worked, and less weighty and cumbrous than the steam engine. As the inventor has neither the time nor the capital essential to the developement of the invention (the nature of which is at present known to himself alone) he has applied for co-operation in our advertising columns.

AMERICAN SHIPS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—How can you be so *unjust* to Mr. Clare and the naval architects of Columbia? What a dolt a man must be, not to discover that every line about the *Niagara* is a "line of beauty," and that the light had no business to strike on curves having the *angularity* of those which so gracefully joined her bow to her broadside. An honest Hibernian friend of mine called it the "*corner* under the cathead." What I complain of is, that you should think any of the people belonging to the "States" that "whip all the world" could produce anything defective, or that any Liverpool man should hesitate to pronounce any production of Yankeedom perfection, whether he had seen it or not.

A naval architect of London went on board of the *Niagara* at Gravesend, and politeness deterred him from descanting upon her deformity; but one of the officers having asked him if he thought we "Britishers" would know what to do with such a *large* ship, he replied, "I was thinking whether we should not make a *long-boat* for the *Great Eastern* of her."

The fact is, our cousin Jonathan has been "all things in turns, but nothing long," with naval architecture. His "kettle bottoms" were perfection; his flat-floored ships, admitting of a waggon road from stem to sternpost, and cut up under the transom to allow of their steering, were perfection; his clippers, such as the *Challenge*, with about one-third deadwood forward and about as much aft, the lightwater line being a longitudinal section of a wine-bottle at each end, with the forecastle and its lumber, the foremast, bowsprit, and all the gear forward resting upon a portion of the vessel not having half enough buoyancy to sustain the weight—they were perfection, although they strained themselves to pieces, spoilt their cargoes, had to be strengthened in British dockyards, and allowed English ships to bear off the palm for fast sailing. The fact is, the *Niagara*, though a formidable man-of-war, is an ugly ship. She is not symmetrical.

I never go on board of an American ship, however, without being struck with the exquisite fairness and smoothness of its decks. Our shipwrights ought to take a leaf out of their book with regard to deck-laying.

One æsthetic fact strikes me in all the productions of the United States; they do not fancy "flowing curves," as we do. The round-house on a ship's deck, the stern, and all about her, have less of the curvilinear than suits our taste. The same affection for straight lines may be observed in their river

boats and their railway and other carriages. We have no right to say that our *beau ideal* ought to be theirs.

In this matter we cannot do better than to discover their good points, and avail ourselves of them. Their decks are admirable; their planking is well wrought, and better finished generally than ours; their wooden knees between decks, with their ends fitted to longitudinal stringers, surpass for strength anything we have in our ships.

I am, Gentlemen, yours, &c.,

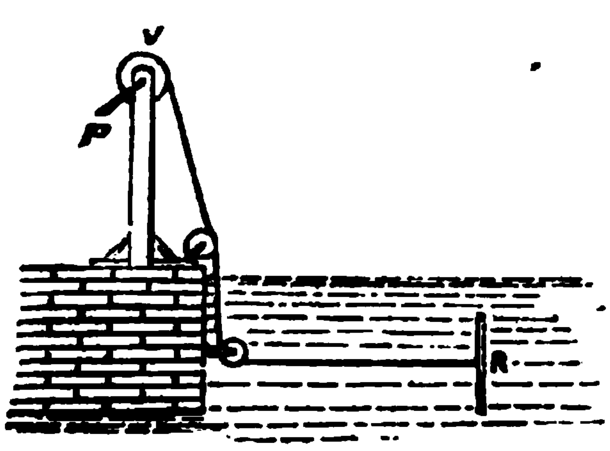
NAUTICUS.

Limehouse, July 16, 1857.

FLUID RESISTANCE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The following question is respectfully submitted to you for solution. Let R be a plane in water; V a winch-barrel; P the winch-handle, keeping P constant both as to motion and pressure; that



is, keep a man turning at—say twenty revolutions per minute; then if V be *enlarged* and R *reduced* in the following ratios, will not the man's work be the same for any given time?

V enlarged 1, 2, 3, 4.
R reduced 1, 4, 9, 16, &c.

And will not this exemplify the meaning of the rule that resistance varies as the square of velocity?

I am, Gentlemen, yours, &c.,

A STUDENT.

Poplar, July 17, 1857.

P.S. Of course friction, rigidity of work, &c., are disregarded.

[Our correspondent's statement of his problem is not very clear to us; but we think he will find a satisfactory answer to his inquiry in the following observations. We assume only that the velocity with which the handle is made to revolve is constant, and that the variations of the winch-barrel and the area of the plane are as stated in the letter. The effect of these variations will be—1st. That the resistance on the moving plane will be constant, because its area is made to vary inversely as its velocity. But, 2nd. As the resistance is constant, and the velocity variable; and as the work done is measured by the product of the resistance and the velocity, it is plain that the work done in any given time is not constant, but varies directly with the velocity. 3rd. This may be seen in another way. As the tension on the string is invariable, and as the diameter of the barrel varies while the length of handle remains constant, it is apparent that the pressure on the handle will vary directly as the diameter of the barrel; therefore the work done in a given time varies directly as the diameter of the barrel.

EDS. M. M.]

PERJURY IN A PATENT CASE.

PRICE'S PATENT CANDLE COMPANY *versus* BAUWENS' PATENT CANDLE COMPANY.

IN our report of the trial of the above case (at page 32 of the number for July 11) we pointed out the extraordinary character of the evidence given by two of the plaintiff's witnesses, Hastings and Murphy, which evidence the jury did not credit, as their verdict proved. These men have subsequently been summoned at the Guildhall, before Alderman Wire and Alderman Hale, to answer a charge of wilful and corrupt perjury, alleged to have been committed in the affidavits and evidence sworn to by them.

Mr. Wilkinson conducted the prosecution, and Mr. Bodkin, instructed by Mr. Wilson, appeared for the defence.

All the necessary witnesses in this case who had been examined at the trial were recalled, and repeated the evidence they gave before Lord Campbell. The affidavits containing the assignments of perjury were put in, and the statements contained therein having been negatived by the witnesses in the usual form, the defendants were duly cautioned and committed for trial, bail being accepted for their appearance at the ensuing sessions of the Central Criminal Court, in two sureties of £100 each, and their own recognisances in £200.

MISCELLANEOUS INTELLIGENCE.

DEFEAT OF MR. BESSEMER'S AMERICAN PATENT.—In America, a patent granted for an invention is liable to be set aside if it can be shown that the patentee has been anticipated by a previous inventor. This regulation has led to the defeat of Mr. Bessemer's American patent for the invention which produced so much excitement a

twelvemonth since. In our number for Nov. 8th, we mentioned that Mr. W. Kelly, of the Suranne Iron-works, Kentucky, claimed to be the inventor of what is called the Bessemer process, and to have exhibited it three or four years ago to several English iron-manufacturers. Mr. Kelly has subsequently obtained a patent for the process. The *Scientific American* informs us that when Mr. Kelly's application for a patent came up before the Patent Office for examination, a patent was refused, of course; an interference was then declared, at his request, and the following document, issued by Commissioner S. T. Shugart, will show the action which flowed from it:—"In the matter of interference between the patent of Henry Bessemer, of London, and the application of William Kelly, of Lyon county, Ky., for improvements in the manufacture of iron and steel, the hearing of which was fixed for the first Monday in April: It appears that, by the concurrent testimony of numerous witnesses, Kelly made this invention, and showed it by drawings and experiments as early as 1847, and this testimony appears to be reliable in every respect. The patent of Bessemer was sealed at London, on the 11th of April, 1856, and bears date the 11th of October, 1855. Priority of invention in this case is awarded to said Kelly, and it is ordered that a patent be issued accordingly, unless an appeal be taken within sixty days from this date." "Thus the interference," says our contemporary, "has been decided, and Henry Bessemer's American patent is of no more value to him than so much waste paper."

Novel Architectural Ornaments and Decorations.—In our 61st volume (page 12) we published a description of a very beautiful invention which Mr. W. Potts, of Handsworth, had produced, and which consists in the combination of marble or stone framings with metallic figures formed by the electrotype process. The last number of the *Birmingham Journal* contains a very interesting article upon the subject. The works to which it directs attention consist chiefly of mantelpieces, in which the several materials of marble, stone, wood, and bronze are brought together in artistic combination, alike as regards form and colour; but the application is by no means limited to these articles, since Mr. Potts has already produced several admirable sepulchral monuments by a similar combination of materials, and this important branch of art will eventually form a leading feature in the application of the patent by which the originator has secured his rights in this process. Mr. Potts appears to have wisely determined that his productions shall be at once English in spirit, in adaptation, and in execution. Even the use of the great works may be said to be peculiarly so, since they constitute art embellishments of that altar of the Englishman's home—the fire-side. As durability is, of course, an important element in works intended to be built in the walls of houses, this forms a primary consideration. In no respect do the productions of Mr. Potts yield to anything hitherto brought out for this purpose. By a patent process, Caen and Bath stone can be infused, and afterwards so hardened by heat, as to take a brilliant and enduring polish, and we are assured that in this state the material is less liable to fracture than ordinary marble. With respect to cost, we may at once state that nothing approaching to the same amount of art skill has ever been offered at so low a rate. Three of the works, if executed in the ordinary way, would cost at least ten times the probable price; whilst others could not be obtained at all, except by inducing sculptors of the very highest class to execute the ornamental portions.

The Physical Power of England.—The physical power which England derives from the transformation of the latent power of its coal into active force is scarcely conceivable by unscientific minds. Professor Rogers, of the United States, furnishes us with the following estimates:—Each acre of a coal seam, four feet in thickness, and yielding one yard nett of pure fuel, is equivalent to about 5,000 tons; and possesses, therefore, a reserve of mechanical strength in its fuel equal to the life-labour of more than 1,600 men. Each square mile of one such single coal bed contains 3,000,000 of tons of fuel; equivalent to 1,000,000 of men labouring through twenty years of their ripe strength. Assuming, for calculation, that 10,000,000 of tons, out of the present annual products of the British coal mines, namely 65,000,000, are applied to the production of mechanical power, then England annually summons to her aid an army of 3,300,000 fresh men, pledged to exert their fullest strength through twenty years. Her actual annual expenditure of power, then, is represented by 66,000,000 of able-bodied labourers. The latent strength resident in the whole coal product of the kingdom may, by the same process, be calculated at more than 400,000,000 of strong men, or more than double the number of the adult males now upon the globe.

Clifford's Boat-Lowering Apparatus.—The *Shannon*, Captain Peel, 51, screw frigate, made her passage to the Cape in fifty-two days under sail, having experienced

fine weather all the way. Two fatal accidents occurred on board during the passage. Mr. Coaker, master's assistant, fell from aloft, struck the fore chains, and fell dead into the water; and the other, George Brown, a boy of the first class, fell from aloft inboard, and was killed. But for the admirable facility afforded by Clifford's plan of lowering boats, with which the frigate was fitted, the body of the unfortunate young officer could not have been recovered, nor the life of another boy, who fell overboard, have been saved. On both occasions the vessel was going at from eleven to twelve knots under all sail, notwithstanding which the boat was manned and lowered in little more than a minute.—*Sun*. [The boats fitted to the *Shannon* on Clifford's plan were 30 feet cutters, weighing with crew and gear from two to three tons each, and the one lowered to save the boy was the *lee* boat.—Eds. M. M.]

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Patterson, J. *Improvements in apparatus for churning, which apparatus is also applicable to the washing of roots and other substances.* Dated Nov. 12, 1856. (No. 2658.)

This consists of a vessel for containing the milk (if used as a churn, or the washing liquid of water, if used as a washing machine), so mounted as to enable it to be shaken or agitated in such a way as to cause the fluid therein to flow violently backwards and forwards in the vessel.

Lukyn, W., sen. *A buffer-break for railway carriages or trucks attached to locomotive engines, whether one or more engines, for the conveyance of goods or passengers.* Dated Nov. 12, 1856. (No. 2659.)

This consists in applying a break so as to diminish the shock occasioned in the event of collision. The patentee introduces upon the buffer-shaft or rod a helical or spiral spring. Reference to the engravings is essential to a complete description of the invention.

Bache, G. I. *Improvements in lamps and apparatus for affording or supplying artificial light.* Dated Nov. 12, 1856. (No. 2660.)

This relates to various improvements upon the glass shades or covers for gas jets, &c., and the means of fixing the same to their holders, and also to certain arrangements of gas burners or apparatus used for the actual combustion of illuminating gas, and to apparatus for regulating and adjusting the flow of gas to the burner.

Weild, W. *Improvements in machinery for doubling, twisting, and winding yarns or threads on to bobbins or spools.* Dated Nov. 12, 1856. (No. 2661.)

This consists in arrangements for holding the bobbin in which the yarn or thread is to be wound against the surface of the drum which is employed to rotate it, and for bringing and holding the bobbin out of contact with the drum when required. 2. In certain arrangements for adjusting the length of movement of the traverse bar, to which the guides are fixed for spreading yarn or thread evenly on the bobbins or spools. 3. In a mode of twisting threads or yarns together, and winding them on to bobbins or spools, by winding the number of threads required on to one bobbin or spool, and then winding the threads off the end of this bobbin or spool on to another bobbin. 4. In machines for winding yarns or threads on to spools or bobbins in the conical form.

Eccles, J. *Improvements in machinery for making bricks, tiles, pipes, and other articles made of plastic materials.* Dated Nov. 12, 1856. (No. 2662.)

This relates to making bricks on the principle for which a patent was granted to J. McHenry, 20th July, 1852, and is supplemental to that patented by the patentee, No. 2288, 26th Oct., 1854, which was for making hollow bricks in machines acting on the principle of the one above referred to.

Balmain, W. H., and T. Colby. *Improved means of grinding various substances.* Dated Nov. 12, 1856. (No. 2664.)

This consists in grinding, pulverizing, or levigating the substances, by agitating them in a liquid, together with a quantity of loose pebbles or small pieces of other hard substances.

Brooman, R. A. *Improvements in the preparation of fibres for spinning, and in machinery employed therein.* (A communication.) Dated Nov. 12, 1856. (No. 2668.)

This consists in an arrangement of machinery for insuring the regularity or evenness of gauge, or thickness of slivers or fibres, by causing the fibres after they come from the carding engine to pass in flat laps between rollers, cylinders, or other like appliances, so connected with drawing rollers as to alter the speed thereof upon any inequality or irregularity of thickness in the laps.

Green, W., jun., and T. Storey. *Improvements in machinery or apparatus for washing or cleaning coal.* Dated Nov. 12, 1856. (No. 2671.)

The coal to be treated is placed in a receiver which opens into a trough or spout near its upper end. At the upper end of

this trough is a reservoir of water having an outlet into the trough, which outlet is opened or closed by a regulating valve. Transversely across the bottom of the trough are hinged a number of stops or breakwaters. Along this trough the coals are carried by the stream of water; and as the coals are of a lighter specific gravity than the pyrites or stones mingled therewith, they are carried over the stops or breakwaters, and pass along the end of the trough into a receptacle fitted with a perforated or strong wire gauze bottom where the water is drained off.

DIXEY, C. W. *Improvements in double opera glasses, and other glasses of a similar nature.* Dated Nov. 13, 1856. (No. 2674.)

This relates to connecting bars for uniting the two barrels of double opera glasses, whereby the glasses are brought close to the eye.

HUTTON, A. *An improved warming apparatus, applicable to railway and road carriages, and other useful purposes.* Dated Nov. 13, 1856. (No. 2675.)

The patentee makes a bag of vulcanized india-rubber, closed at one end, and at the other end fixes a tap or valve with a screw plug, through which valve he passes hot water, hot sand, or other heating substance or fluid; and when the bag or vessel is full he secures the tap or valve with the screw plug. The bag thus filled, he encloses in a covering of cloth or other material, serving both as a warmer and a footstool.

HOLT, T. S., E. EARNSHAW, and J. BARLOW. *Improvements in certain parts of steam engines, steam boilers, and apparatus connected therewith.* Dated Nov. 13, 1856. (No. 2676.)

This relates—1. To an equilibrium safety valve. 2. To an equilibrium float valve, for the purpose of allowing the steam and water to escape upon the fire when the water in the boiler is too low. 3. To a mercurial steam-gauge. 4. To a compensation lever safety-valve. 5. To a feed-water warmer for stationary, locomotive, and marine engines. 6. To a compensation lever for governors of steam-engines. 7. To a feed-engine or pump for boilers, &c. 8. To a method of working and placing air-pumps of vertical stationary engines. 9. To vertical boilers.

NEWINGTON, S. *Improvements in dibbling apparatus.* Dated Nov. 13, 1856. (No. 2677.)

An angular trough is used to contain the grain, divided into as many compartments as there are dibbles. At the bottom of the trough is a sliding bar, having a hole through it for each dibble, and by this hole the grain is allowed to fall, when the bar has been moved into position to bring the holes in the bar to coincide with the inclined holes through the bottom of the trough, such inclined holes communicating with the holes or passages through which the dibbles slide at the back of the trough.

KINNIBURGH, J. *Improvements in moulding or shaping metals.* Dated Nov. 13, 1856. (No. 2680.)

This relates principally to the moulding of hollow or tubular articles of cylindrical contour, and is also applicable in the manufacture of articles resembling pipes in general structure. Core bars, capable of contracting in diametrical dimensions, are used. These core bars are each composed of three longitudinal pieces of curved metal, or segmental metal plates, combined together so as to form a bar of the desired diameter, with their longitudinal junction edges in contact with each other. On a spindle are keyed small eccentrics. Connecting rods pass from these, and are jointed to a long, narrow, externally-adjusting wedge-shaped piece, which virtually forms a fourth segment of the core bar.

COCHRANE, Honourable W. E. *Improvements in the permanent way of railways.* Dated Nov. 14, 1856. (No. 2681.)

This consists in securing the ends of the rails at their junction with each other by a dowel, key, or tongue, and an improvement on a cast-iron railway sleeper, patented by the patentee and H. Francis, enrolled 5th March, 1851, consisting in discontinuing the vertical ribs or wooden sleeper holders cast on the upper surface of the plate, and placing them below the surface of the said plate.

HACKING, J. *Certain improvements in machinery for dressing, polishing, and finishing threads and yarns.* Dated Nov. 14, 1856. (No. 2683.)

This consists—1. In connecting a series of brushes to a strap, guided by a plate, by which means more friction is obtained than when circular brushes are used. 2. In imparting a reciprocating motion to the brush. 3. In an arrangement of rollers, on which the hanks of thread or yarn are distended. 4. In a compound machine for dressing, polishing, and finishing yarns or threads.

EMERY, R. *Improvements in springs for carriages and other vehicles.* Dated Nov. 14, 1856. (No. 2686.)

This consists in constructing leaf springs for carriages by placing between each leaf of steel a sheet of metal, or other material. Zinc, tin, and copper are preferred. The objects are—1. To prevent the succeeding leaves of steel from coming in contact. 2. To prevent corrosion by means of bringing into contact the opposite metal between the

succeeding leaf, keeping up while in contact a galvanic action.

EMERY, R. *Improvements in the construction of axles and boxes of carriages for common roads.* Dated Nov. 14, 1856. (No. 2687.)

This consists—1. In having the front and back bearings parallel with the axis of the axle. 2. In constructing the axle boxes of metal, and bushing them with a different metal from that which the box is made of.

SUTHERLAND, J. *An improved railway break.* Dated Nov. 14, 1856. (No. 2691.)

The patentee makes use of friction drums or barrels, one of which he attaches between the wheels to each of the ordinary running axles of a carriage. These are placed on the several axles in a direct line with each other, and each of them is acted upon by a friction strap or band of metal, which has one of its ends attached to the framing of the carriage, and the other fixed to a rod or bar running parallel to the drums. At one part of the rod is attached a screw, which passes through a nut in a worm wheel, actuated by an endless screw on a vertical shaft, having on its upper end an ordinary lever or winch handle, to be worked by the guard or breaksman.

SYMINGTON, A. *Improvements in apparatus for drying yarns and woven fabrics.* Dated Nov. 14, 1856. (No. 2694.)

According to one arrangement, a number of rollers is arranged to bear at each extremity upon two inclines, the central portion of the rollers having the spindles of wet yarn spread over them. These spindles are held in a state of tension by other rollers which are suspended in the hanks. A current of hot air is passed through the chamber, and dries the yarn. As each roller of yarn is dried it is removed through a door at the lower end of the inclines, and the rest of the rollers descend by their own gravity to fill up the space left by the withdrawal of the last roller. As fast as a roller is withdrawn at one end of the chamber a fresh one with wet yarn is introduced at the other.

BINKS, C. *Improvements in converting iron into steel, and in giving a coating of steel to iron.* Dated Nov. 14, 1856. (No. 2695.)

This relates—1. To a mode of effecting the instantaneous production of steel as a consequence of the reactions at the points of contact between heated metal and carbon and nitrogen, or nitrogen and hydrogen compounds, the application of either or of both producing steel according to the special condition of the iron. 2. To a method of producing a coating of steel upon iron, and to the producing upon the surface of manufactured iron articles a coating of steel during the process of manufacturing. 3. To improvements upon the (so called) cementation process for converting iron into steel.

REID, A., and C. O'NEIL. *Improvements in treating metallic ores to obtain copper.* Dated Nov. 14, 1856. (No. 2696.)

This relates especially to means by which copper can be obtained from the poorer kinds of ores containing that metal, such, for instance, as contain only from one and a half to three per cent. of metal. The patentees first reduce the ore to a fine powder. This reduction of the ore they effect by any ordinary crushing apparatus, and while the ore is in the process of reduction they mix crude kelp, the quantity of which is regulated according to the per centage of sulphur in the ore. They then place the mixture in a reverberatory furnace, so constructed that the admitted air may play on the surface of the above mixture. The heat of the furnace is now slightly raised, the ore becoming oxidised as the heat increases. When the ore and matters are found to be free from moisture they raise the heat to a dull red for three hours or more, until it is found that no more sulphurous acid fumes are disengaged. The calcined mixture of ore and kelp is placed, whilst red hot, into vessels containing boiling water, in which the boiling is continued until all the metallic salts are dissolved. The solution is allowed to settle and the clear supernatant fluid drawn off whilst hot, and run into reservoirs containing scrap or other iron which decomposes the solution, and metallic copper is precipitated.

GREAVES, J. *An improved construction of ladies' side saddle.* (A communication.) Dated Nov. 14, 1856. (No. 2698.)

The near side horn of the saddle is attached to the side of the saddle tree near the front, and some distance below the head of the saddle tree; and the leaping horn is attached to the near side horn.

LESEURE, N. P. J. *An improved embroidering machine.* Dated Nov. 15, 1856. (No. 2700.)

This consists—1. In a peculiar arrangement of levers for transmission of the movement. 2. In a peculiar construction of pincers. 3. In a peculiar form of eccentric for working the needle. 4. In the construction and employment of a rod for holding the thread.

FOX, H. H. *Improvements in manufacturing brushes.* Dated Nov. 15, 1856. (No. 2701.)

This relates—1. To sorting the bristles by drawing them by their tops into different lengths or sizes, preparatory to their being attached to the brush handles, and in the same or similar appliances for mixing the bristles. 2. In mechanical appliances for forming the caps into which the bristles of

painters or other brushes are fixed. 3. In laying or binding the twine, wire, or other binding material round painters' tools, &c. Lastly, in forcing the handles through the bristles, when the latter are confined in one of the caps.

MUSHET, R. *Improvements in the manufacture of iron.* Dated Nov. 15, 1856. (No. 2703.)

The patentee claims the reducing pig or cast iron into a granular state or powder, by subjecting it, whilst in a heated state, to the action of mechanical force by means of rollers, hammers, or other apparatus.

BARCLAY, A. *Improvements in the manufacture of iron.* Dated Nov. 15, 1856. (No. 2704.)

Here a species of compound reverberatory furnace is employed, consisting of a fuel chamber of the ordinary kind, a molten metal or puddling recess, an inclined hearth for the calcined ore, a reverberatory arch, and a vertical draught chimney. The raw ore is first calcined, and the calcined ore is deposited upon the inclined hearth of the reverberatory furnace, which is at one end of the furnace structure, and slopes downwards towards the puddling recess. At the upper end of the inclined hearth an entry passage is made through the wall of the structure for the purpose of admitting whatever flux may be needed for admixture with the roasted ore upon the hearth. When the fire is lighted in the furnace, the flame and heat of the fuel therein being directed upon the inclined hearth, the ore is gradually reduced, and the iron trickles down the incline and falls into the recess at its base.

DAVIES, G. *An improved paper suitable for the filtration of liquids, the dressing of wounds, and for the manufacture of envelopes, bags, bands, and for other similar purposes.* (A communication.) Dated Nov. 15, 1856. (No. 2705.)

A layer of pulp having been laid on the wire cloth to form one face of the paper, a piece of tissue is laid thereon, and is then covered with a second layer of pulp to form the other face. This second pulp contains a mixture of powdered vegetable or animal charcoal.

BILLING, J. *Improvements in chimneys.* Dated Nov. 15, 1856. (No. 2706.)

The top of each chimney is made of a conical or pyramidal form of straight or curved contour, with or without a level or inclined base or surface on each side of the top of the stack. A vertical partition is placed between each chimney top to prevent the smoke from one chimney descending into an adjoining one.

PYE, G. *An improvement in treating and bleaching cotton.* Dated Nov. 15, 1856. (No. 2707.)

This consists in subjecting cotton, whether in the raw state or not, to the action of a solution of fuller's earth, by which the natural colouring matters and the gummy properties are removed.

DREW, J. *Improvements in library tables or desks.* Dated Nov. 15, 1856. (No. 2709.)

This consists in a new arrangement of flap or slope, and in a hinge-lock connected therewith, and communicating with a set of bolts on one or both sides thereof, which bolts lock and unlock a nest or nests of drawers as may be required at the back of the table, and on one or both sides of the slope. The slope is formed with a hinge at or about the centre thereof, which, on being hinged back, and the whole slope turned up, exposes fittings immediately in front of the writer or user. The main hinges to the slope, while it is being turned back, bring down a bolt or bolts on each side thereof, and allow of the drawers above mentioned being opened; the return of the hinged flap to its original position acts upon the bolts and locks the drawers.

BINKS, C. *Improvements in the manufacture of iron and steel.* Dated Nov. 15, 1856. (No. 2711.)

This consists—1. Of processes and apparatus for the purification and for the conversion into wrought or malleable iron of crude cast iron, the product of any blast furnace operation, and containing the excess of carbon and other impurities common to such iron; and—2. Of processes and apparatus for the conversion of such iron when thus purified, or of purified iron obtained from any other source, into steel.

EECKMAN, A. M. J. *A mechanical bakery and cookery.* Dated Nov. 17, 1856. (No. 2713.)

This relates—1. To the application of several moveable baking floors placed one above the other, revolving by the action of a common central vertical shaft. And, 2. To the spherical shape of the ends of the kneading box, which allows the dough to be completely kneaded and easily removed. Also in the application of a warming pan to prevent the dough cooling while working it.

BLANCHON, E. *Machinery and apparatus for marking and boring leather and other similar substances, for making and cutting screwed pins, and for uniting leather and other similar materials.* (A communication.) Dated Nov. 17, 1856. (No. 2717.)

This is intended chiefly for the pegging of soles to boots, shoes, &c., but it is applicable generally to the fastening of two or more surfaces of leather or other material together. There are three apparatuses employed, and for convenience, the inventor fixes them all on one table, so that no time may be lost in taking the articles from one to another. The first apparatus is for

marking, at regular intervals, the spots where holes are to be bored. The second is for boring a hole at every point marked by the apparatus just named; or it may be applied to unmarked surfaces. The third apparatus is for cutting a screw thread on a piece of wire or other soft metal, screwing it into the surfaces or substances to be united, and for cutting off the metal stud or screw, flush or nearly so, with the surface.

WILSON, J. *Improvements in springs for railway and other carriages.* Dated Nov. 18, 1856. (No. 2719.)

This invention consists in making springs for railway and other carriages from steel having a curved or convex figure, instead of the flat steel ordinarily employed.

LISTER, S. C. *Improvements in spinning.* Dated Nov. 18, 1856. (No. 2721.)

This consists in running, roving or spinning frames, at varying speeds, as it is especially important in roving frames to run gradually as the bobbins fill. The details employed cannot be described without engravings.

MAGNAY, F. A. *Improvements in damping paper for printing.* Dated Nov. 18, 1856. (No. 2722.)

In a patent dated 17th October last, granted to the patentee and R. R. Whitehead, there was described an invention whereby paper was to be damped by being carried on an endless wet felt, and pressed between rollers. Now, this invention consists in adding to this machine two perforated pipes for throwing jets of water on to the upper and under surfaces of the paper before it passes under the pressing roller.

BUTTERWORTH, R. *Improvements in the means of securing the ends of rails for railways.* Dated Nov. 18, 1856. (No. 2723.)

The ends of the rail form a "butt" joint, and in the end of each rail a semi-circular notch is cut in the web of the rail, so that when the ends of the rails are together, the notches form a circular hole, one half in each rail. In this hole a circular key of wrought iron is placed.

DYER, S. *Improved mechanism applicable to propelling ships and vessels, applicable also as power machinery for ships' purposes.* Dated Nov. 18, 1856. (No. 2724.)

The patentee has upon or near the deck of a vessel a framing securing wheelwork. One of the wheels of this train of wheelwork is to be connected with a corresponding wheel on a spindle or axis, which descends to the shaft of the screw or other propeller placed in the stern or other convenient position, and by suitable gearing communicating rotation thereto.

BESSEMER, H. *Improvements in the manufacture of iron.* Dated Nov. 18, 1856. (No. 2726.)

This relates to certain modes of constructing and employing reverberatory or puddling furnaces in the manufacture of iron, whereby the patentee is enabled to facilitate the process of puddling, and to employ the spare heat of the puddling furnace in the process of re-melting and in the process of refining other portions of iron, and also for the reduction of the slags or oxides of iron, and the obtainment of metallic iron therefrom.

BRINDLEY, W. *Improvements in the treatment and application of papier mâché made for covering floors, roofs, and other like useful purposes.* Dated Nov. 19, 1856. (No. 2727.)

The patentee first prepares the papier mâché by putting it into a perforated metal sieve or frame to obtain sheets of any required thickness, and ornaments such sheets while in a soft state by embossing the surface by raising figures thereon, which is effected by means of metal, papier mâché, or other stencil plates or like means.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

MAW, A. *An improved mode of constructing the eccentrics or cams of steam engines and other machinery.* Dated Nov. 12, 1856. (No. 2665.)

The inventor fits segmental pieces of brass into recesses formed in the inner side of a metal ring which encloses the cam or eccentric, so that they shall form a sufficiently continuous circle for the eccentric to work in, and he keeps them in contact with the eccentric by screws passing through the outer metal ring in which they are contained, or by springs or packing placed between the outer ring and the pieces of brass, or by a combination of screws, springs, and packing.

APPERLY J., and W. CLISSOLD. *Improved apparatus for condensing wool, cotton, and other fibrous substances.* Dated Nov. 12, 1856. (No. 2666.)

Here the ribbon is taken from the doffer of the carding cylinder, and passed through the axle of a revolving pulley, the hole through which it is preferred to make in a diagonal direction. Passing the ribbon through the axis of a rotating pulley will produce the condensed yarn in a simple and effective manner.

BOULAY, J. C. *An improved method of printing in various colours simultaneously.* Dated Nov. 12, 1856. (No. 2667.)

Here the inking table is composed of a frame similar to the chase of the type form arranged with pieces of wood or reglets of metal, corresponding with the various lines of colour required in the form to be printed.

The invention applies only to the case where the inks are disposed in parallel directions, and they are applied to the type by divided rollers.

BROOMAN, R. A. *A new or improved felted fabric.* (A communication.) Dated Nov. 12, 1856. (No. 2669.)

The cardings are collected and placed in layers, one over the other, until a web or sort of wad of the desired thickness is obtained, which is pressed between rollers, and the layers and filaments united together by sewing. The fabric is then fulled or felted, and finished in the usual manner.

PACKMAN, F. J. W., and C. F. PIKE. *An armed glove or covering for the thumb and fingers.* Dated Nov. 12, 1856. (No. 2670.)

This consists in affixing into the thumb and fingers of gloves, and other coverings for the hand or fingers, pointed steel blades, hooks, or claws, solid or hollow.

JOHNSON, J. H. *Improvements in machinery or apparatus for cutting and folding paper.* (A communication.) Dated Nov. 13, 1856. (No. 2672.)

This relates to a peculiar arrangement of machinery for cutting and folding paper, and is chiefly applicable to folding printed sheets ready for stitching and binding. The sheet to be folded is, by an arrangement of register pins and pressing plates, carried to a series of pairs of folding rollers, the number of rollers being regulated by the number of folds to be given to the paper. By suitable additions the machine may also be made to separate the two halves of a sheet, which have been printed from the same form.

TREEBY, T. W. G. *Forming sewers or tunnels, and galleys to tunnels.* Dated Nov. 13, 1856. (No. 2673.)

This invention consists—1. In forming a railway in the sewer to get rid of the earth. The rails are formed on the invert, and where they come the part may be hollowed out so as to prevent extra weight of material. 2. In causing a current of air to be drawn through, so that the sewer or tunnel may be carried any distance without disturbing the ground above. 3. Of a gulley sluice trap for carrying off the surplus drainage. 4. In forming pipes with longitudinal joints as well as the common traverse joints that are now used. The object of this is that the pipes may be taken through the sewer or tunnel in separate parts and afterwards put together.

EARP, T. *A tap for measuring liquids.* Dated Nov. 13, 1856. (No. 2678.)

This tap is adapted for measuring spirits in small quantities, and is constructed with a hollow cylindrical plug of large diameter. In communication with the plug is the receiver which, with the capacity of the plug, forms the measure for the liquid. At the top of the measure chamber a valve is placed for the inlet and egress of air, and is closed by a float when the vessel is full of liquid.

FRANCIS, W., and J. HOOPER. *Improvements in tanning and dyeing leather, linen, cotton, wool, hair, and silk, and fabrics composed of any of these substances.* Dated Nov. 13, 1856. (No. 2679.)

The materials to be tanned or dyed are placed in an exhausting vessel, and after exhaustion the tanning or dyeing liquor is forced in.

FONTAINEMOREAU, P. A. L. de. *An improved method of forming letters or devices on metallic surfaces.* (A communication.) Dated Nov. 14, 1856. (No. 2682.)

A zinc or other metallic plate is employed, on which are formed by the usual means the designs desired. By this means the plate exhibits in blank the parts cut out, into which is poured a metallic compound consisting of tin 2 parts, bismuth 2 parts, antimony 1 part, which composition, in contact with zinc and copper, resists the action of acids.

SHARP, T. B., and J. A. COLLET. *Certain improvements in locomotive steam engines.* Dated Nov. 14, 1856. (No. 2684.)

Here the waste steam exhaust in two directions, from the exhaust parts of the cylinders upwards through the blast pipe into the chimney, and downwards into a feed water heating apparatus placed below or near the cylinders, and consisting of a chamber having tubes for the water, which is supplied from the tender; or the downwards exhausted steam is conveyed through a pipe into the tender or tank.

HUART, A. E. *An improved toy for the use of children.* Dated Nov. 14, 1856. (No. 2685.)

This toy exactly resembles the children's balloons which are now well known.

DAY, J. R., and T. RUTTER. *A new or improved metallic tile for roofing or covering buildings.* Dated Nov. 14, 1856. (No. 2688.)

This consists of a rectangular sheet of metal, one of the edges on the longer side being turned up at right angles to the plane of the sheet. The opposite edge is turned up at right angles, and the extreme edge turned down again so as to form an inverted trough-like figure running along the side of the sheet. A series of inverted V formed or curved elevations are raised across the sheet of metal by stamping or otherwise.

MONEY, E. *An improved artificial manure.* Dated Nov. 14, 1856. (No. 2689.)

To ten parts, by weight, of pulverised coal are added five parts of caustic lime (in the state in which it leaves the kiln) five

parts of common salt and one part of sulphuric acid.

HEU, J. B. *Improvements in preserving animal and vegetable substances suitable for food.* (A communication.) Dated Nov. 14, 1856. (No. 2690.)

The substance is cut into pieces, and hung up in a heated chamber containing an atmosphere of carbonic acid gas. When dried the pieces are dipped into a bath of gelatine, and the film of gelatine allowed to dry; and, lastly, they are plunged into a bath containing tannin. Each piece should be covered with coarsely powdered bark when packed.

ASH, H. C. *Improvements in railway signals.* Dated Nov. 14, 1856. (No. 2692.)

At a distance, say of two miles from each signalman, a signal apparatus is placed, and from the signal man to the apparatus a telegraph wire passes, and within the signal the telegraphic wire is in connection with an electro-magnet which, by an electric current, liberates the signal, and brings it in contact with a trigger in connection with the passing train, and thus an alarm on the train is brought into action.

SAUL, D., and P. WILLIAMS. *Certain improvements in machinery or apparatus for spinning and doubling cotton and other fibrous materials.* Dated Nov. 14, 1856. (No. 2693.)

This relates—1. To the "bolster," or "brush;" and, 2. To the washers employed to regulate the drag to the bobbins. The bolsters are so formed as to have two bearings for the spindle, about 2 inches from each other. Between these bearings is formed a cavity in the interior of the bolster, which may be filled with wool or other material to retain the oil for lubricating the spindle. A metallic washer is placed between the ordinary washer cloths employed beneath the revolving bobbins in order to regulate the necessary "drag" required in throstle spinning upon bobbins or spools.

CRAWLEY, J. *Improved machinery for stitching fabrics.* Dated Nov. 14, 1856. (No. 2697.)

The inventor employs two threads as heretofore; one is passed through the eye of a needle, which is carried up and down through the two pieces of fabric intended to be united together, and the other contained in a shuttle made to pass through a loop formed by the first thread.

AITKEN, J. *Improvements in the furnaces employed in the manufacture of iron or other metals.* Dated Nov. 14, 1856. (No. 2699.)

At the top of the furnace is a pipe connected with a fan or air pump, which, being worked by an engine, will exhaust the air from the furnace and from a partial vacuum above the metal; this will cause a current of air to pass from apertures below through the metal.

HOARE, D. J. *Improvements in the manufacture of iron.* Dated Nov. 15, 1856. (No. 2702.)

The iron having been converted into a fluid state, the inventor causes the stream of metal to flow out on to the head of an incline channel. At the bottom or end of this channel a receiver may be constructed, into which the metal will be delivered. In its passage through or along this inclined channel the metal will be subjected to sudden changes in its direction, caused by the interposition of certain breaks, or turning points, so placed as to cause the same to free itself from air bubbles, and from other impurities.

BLACKBURN, H. *Improvements in billies and mules, for slubbing and spinning wool, cotton, or other fibrous materials.* Dated Nov. 15, 1856. (No. 2708.)

The object here is to prevent the breaking of the ends of the yarn while slubbing and spinning, by adapting to billies and mules certain mechanism whereby the operation of piecing the ends of the yarn is for the most part dispensed with.

ROBINSON, N., J. LISTER, and H. STEVENSON. *Improvements in looms for weaving.* Dated Nov. 15, 1856. (No. 2710.)

This relates—1. To the lathe or going part, and consists in the application of apparatus in connection therewith, to secure the reed in its place, at both ends, when the shuttle is properly in the box at either end of the lathe, but loose or free to move out of place when the shuttle is out or not properly in either box, by which means they prevent breakage of the warp when the shuttle stops in the shed. 2. To the picking motion, and consists in the application to ordinary looms of certain apparatus for picking, which was patented March 15, 1855.

COPE, T. *Improvements in tobacco-cutting machines.* Dated Nov. 17, 1856. (No. 2712.)

An endless wire band works over a series of rollers in the trough, placed to supply the tobacco to the cutters. The tobacco is pressed from the above by a shorter endless wire band placed at an angle, and which is also supplied with a series of rollers, the object being to compress the tobacco while being carried forwards towards the metal mouth-piece opposite, and ready for the cutters, which are formed by placing one or more scimitar-shaped cutters or knives on the periphery of a metal disc, and so arranged as to be self-sharpening.

WORTHINGTON, J. *An improved mode of signalling from the guard to the engine driver*

on railway trains. Dated Nov. 17, 1856. (No. 2714.)

This consists in giving signals to the engine driver by striking a sonorous body, or putting a pendulum in motion, by means of projectiles.

MICHEL, C., and I. A. MARET. *Making atmospherical observations.* Dated Nov. 17, 1856. (No. 2715.)

This consists in employing balloons of india-rubber, filled with hydrogen gas, and coated with a varnish of 1 lb. (avoirdupois) of isinglass in one pint of water, and also with gum varnish and carmine, to which is added alkali.

HAWKES, W. *New or improved machinery for applying steam power to the ploughing of land and other agricultural operations.* Dated Nov. 17, 1856. (No. 2716.)

The inventor makes the tractile power act in a direct line upon the implement to be moved, the engine being placed lengthways with the line of draught. Two pulleys or drums of large diameter are worked alternately by a pinion being made to engage alternately in spur wheels on the said pulleys. The engine is upon wheels at right angles to its longitudinal axis, and worked by a rope or chain.

JONES, G. and J. R. *An improved life boat.* Dated Nov. 17, 1856. (No. 2718.)

The keel, stern, and stern post are formed as in an ordinary boat; above the keel, at a point above what will be the water line of the boat, there is a second keel extending from the stem to the stern post. From the sides of this second keel the bottom of a boat is constructed, after which a number of cells or water-tight compartments are constructed between the bottom of the upper keel and bottom of the lower keel, after which a complete boat is built from the lower keel upwards, the sides of the upper bottom being brought in combination with the sides of the boat.

PROVISIONAL PROTECTIONS.

Dated May 6, 1857.

1274. Johann Philippe Becker, of Paris. Improvements in the mode of silvering animal, vegetable, and mineral objects.

Dated May 21, 1857.

1438. John Wesley Hackworth, of Darlington, engineer. Improvements in machinery or apparatus for forcing, lifting and exhausting æriform bodies and liquids applicable to blast furnaces.

Dated May 27, 1857.

1494. James Savory, of Tewkesbury, Gloucester, engineer and machinist. A machine for separating seeds, whitecoats, and dirt from wheat and seeds, awns, and dirt from barley, and for cleaning and polishing wheat barley, and other grain fit for market.

Dated June 2, 1857.

1550. Charles Shaw, of Birmingham, photographic matt maker. A new or improved manufacture of matts for photographic and other pictures.

Dated June 12, 1857.

1645. Joseph Whitworth, of Manchester. Improvements in ordnance, fire-arms, and projectiles, and in machinery employed in their manufacture.

Dated June 17, 1857.

1693. Henry Hosch, of Old Jewry-chambers, London. An improved shirt cutting machine. A communication.

Dated June 20, 1857.

1722. William Wright, of Sheffield, plumber. Improvements in flushing apparatuses applicable to cisterns and water closets.

Dated June 22, 1857.

1741. John Norris, jun., of New York, manufacturer, and George Worstenholm, of St. Louis, Missouri. Improvements in machinery for making nails, bolts, spikes, screws, rivets, and screw blanks.

1743. Richard Murdoch, of Baltimore, U.S. Improved running gear for vehicles.

1745. Thomas Mackenzie, of Rathbone-place, Oxford-street. Improvements in the internal decorations of those parts of buildings to which window draperies are to be affixed, and in the arrangement and construction of the curtain fixtures.

Dated June 24, 1857.

1761. Robert Mallet, of Bridge-street, Westminster, civil engineer. Improvements in tiles and coverings for roofs and other parts of buildings.

1763. Henry Genhart, armourer, of Liege, Belgium. Improvements in fire-arms in rifleing the same and projectiles employed therewith.

1765. John Juckes, of Dame-street, Islington. Improvements in washing machinery.

1767. Jabez Church, of Upper Kennington-lane, Vauxhall. Improvements in the manufacture of artificial fuel.

1769. George Henri Marc Muntz, of Handsworth, Stafford, engineer. Improvements in the manufacture of metal tubes and axles or shafts.

1771. Ernest Auguste Bourry, of St. Gall, Switzerland, engineer. Improvements in apparatus or machinery for working, expressing, and moulding clay and other plastic materials.

1773. John Henry Johnson, of Lincoln's-inn-fields. Improvements in the preparation of surfaces for receiving paintings or printed impressions thereon. A communication from E. Lee, of Baltimore.

1775. Edouard Besnier, de la Pontonerie, of Paris, merchant. Improvements in apparatus for consuming smoke.

Dated July 1, 1857.

1831. Joseph Nickless, of Coalbrook Dale, Salop, pattern maker. A new or improved railway chair.

1833. Alexander Prince, of Trafalgar-square, Charing-cross. Improvements in the construction of irons used by tailors and others for pressing cloth and other materials. A communication from Schaffer and Walcker, of Berlin, and J. Herschmann, of Prague.

1835. William Edward Newton, of Chancery-lane. Improved processes for ornamenting metallic surfaces, and for producing surfaces in intaglio or in relief for printing purposes. A communication from C. Negre, of Paris.

Dated July 2, 1857.

1837. Frederic Ludwig Hahn Danchell, of New

PROVISIONAL REGISTRATIONS.

June	29	899	J. Underwood	Birmingham	Bag purse.
	30	900	J. Bowman	Liverpool	Double action travelling block for removing casks.
	,,	901	J. Bird	Connaught-square	Vertical air brick.
July	2	902	T. Simmons	Birmingham	Vapour bath.
	8	903	G. Packwood	Northampton	Elastic seat piece for trousers.
	13	904	Carrett, Marshall, & Co.	Leeds	Steam crab.
	15	905	F. Jacques	Manchester	Hat or cap.
	,,	906	A. & A. M. Marks	London-wall	Button.
	,,	907	A. Straker and Son	Monkwell-street	Music wrapper.
	17	908	H. J. and D. Nichol	Regent-street	Coat sleeve.
	20	909	F. Wood and Sons	Brighton	Reclining chair apparatus.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Puckle and Hendrick, Birmingham; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburg.

Mechanics' Magazine.

No. 1778.] SATURDAY, AUGUST 1, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street.

WHINES' PATENT MACHINE FOR DOVETAILING, GROOVING, SLOTTING, AND RABBETTING.

WHINES' PATENT MACHINE FOR DOVETAILING, GROOVING, SLOTTING AND RABBETTING.

MR. JOHN WHINES, foreman of joiners at the well-known firm of G. Smith and Co., Pimlico, has patented a machine for dovetailing, grooving, slotting, and rabbetting, by the aid of which an ordinary workman can produce in a superior manner as much as six skilled workmen by the ordinary method. It is perfect in its operations, for boxes, drawers, carcases of bookcases, wardrobes, &c., upon any description of material from ½ inch to 1½ inches in thickness and from 1 inch to 22 inches in width, its range being quite capable of meeting the ordinary requirements of a joiner's or cabinet maker's shop. For any special purpose, a larger machine could be constructed upon the same principle. The article to be dovetailed requires neither marking nor setting out, nor any fitting or hand labour after leaving the machine, but simply glueing and putting together. We have seen specimens of dovetailed work executed by the machine, and are certain that it could not be equalled by hand labour, without the utmost care. The machine is also exceedingly useful for bead and flush framing; for cutting or rabbetting the ends of panels, mitreing the beads thereon, and also the beads to be inserted, which operation it also performs expeditiously, and in a perfect manner; in short, it is capable of mitreing any kind of mouldings, whether stuck on the solid or planted in. It is also fitted with a suitable block and cutter for forming saw teeth, racks for moveable bookcase shelves, and for bevelling the ends of cross bearers to support the same. The whole of its operations are performed with accuracy and dispatch, without any of the tedious work of setting out, the machine itself performing all that is necessary.

Fig. 1 is a front, and fig. 2 an end elevation of the improved dovetailing machine; and fig. 3 is a plan of the same. A A' are the end framing or standards, which support the machine. B is a piece of framing which binds the two standards, A A', together. C is the top, or platform, on which the upright double swan neck bracket D is fixed. E is a sliding frame fitted with suitable guides, *a a*, which fit to corresponding slides or guide ways on the upper side of the front platform, C'. The sliding frame, E, is capable of moving from right to left, and from left to right as occasion requires. Similar guide ways, *c c*, are formed on the upper side, and at the ends of the frame E; these guide ways are at right angles to the guides, *a a*. On the lower side of the frame, E E', is a table having corresponding guides on its underside, capable of sliding in the guide ways, *c c*. The table E is moved and adjusted as required by a screw worked by a hand-wheel, *e*. Thus the frame, E, and table, E', are rendered capable of having motion imparted to them at right angles to each other, similar to those of an ordinary slide rest. F F are guide pieces, or fences, for the material to be operated on to abut against. These guides have a right and left motion imparted to them, when necessary, by means of right and left hand screws cut or formed on the same spindle, G; these screws take into nuts formed on the castings on which the guide pieces, F F, are secured, and the spindle on which the screws are cut is caused to rotate by means of a handle. By turning the handle and screw spindle, G, the guide pieces, F F, are caused to advance towards each other until they meet, if necessary, and by turning the handle and spindle, G, in a reverse direction, the guide pieces, F F, are caused to separate or recede from each other. G' G' are slotted uprights secured to the ends of the table, E', and in their slots are inserted bearings which are capable of being slid up or down, and secured in any desired position by nuts. In the bearings the journals of the roller, *g*, turn. These journals are eccentric to the roller, *g*, so that when the lean side of the roller is undermost, any piece of material placed in the space between the roller, *g*, and the upper surface of the table, E', is held fast by the full side of the roller, which embraces it when the roller, *g*, is turned through a portion of a revolution by the handle, *g'*. The upright double swan-neck bracket, D, has a vertical guide piece, D', formed or cast on its centre. This guide piece is hollow, or it may be formed in two parts, fitted and fixed together in such manner as to allow the stem of the bit stock, *h*, to slide or work freely in it. The stem may have grooves formed in it so as to work over suitable pins or guide feathers in the guide piece, D'. As it is necessary that the stem and bit stock, with any of the cutter bits which may be fixed therein, shall have an easy vertical motion, but be effectually prevented from turning round, the stem of the bit-stock is made in two parts, and regulated in length by a screw on the interior turned by a button, *h'*, to adjust the depth of cut. On the upper piece of the stem a leg is formed, and projects through a slot in the back of the guide, E'. A rod, *i*, is connected above to the lug, and below to a shackle fixed on a spring, which forces it upwards, and to the same spring the lever, H, is connected by a link. The lever, H, is connected by a link, H', to the lever or treadle, H'', which consequently, when depressed, draws down the rod, *i*, and the bit-stock with its bit. To the lever, H'', at *j* are likewise jointed the rods, *j' j'*, which we jointed at their upper end to bell-crank levers. Other two smaller bell-cranks are centred on the short arms of the first bell-cranks. To one end of each of the small bell-cranks, are jointed the rods *i' i'*, while the other ends are paul-shaped, to take into two sets of ratchet teeth set in contrary directions. These teeth are formed in steel bars, which are firmly secured to the underside of the frame, E'; only one of the bell-crank pauls can be in gear at a time, but both may be kept out of gear at the same time by the rods, *i' i'*, the ends of which pass through holes in the end framing or standards, A'; notches are formed or cut in these rods into which the ends of a circular bolt or clutch take. The circular bolt is centred on a pin, I', fixed in a bracket or on the standard, A'. *n*, a rod, is jointed to the lower end of the lever or arm of the circular bolt, and to the lower end of a lever, *n'*, which is centred on a pin fixed in the end framing, A'. The moving of the lever either way, throws either of the ends of the circular bolts into one or other of the notches in the rods, *i' i'*. The ends are bevelled off or tapered so that they may enter the notches easily, and so act or press on their edges as to move either of the rods on end a short distance, and thus cause either of the bell-crank pauls to be kept clear from the ratchet teeth, and stop the travel of the frame, E, and table, E'. Helical springs, *k*, are fitted to the rods, *i i*, to force the pauls into gear with the ratchet teeth. The rod—which is, for the time being, locked by the ends of the circular bolts—has its corresponding paul out of action with its ratchet teeth. Two links, J J, are jointed to the lower part of the bell-crank levers; these links meet at their lower ends, and are jointed on a pin which passes through both links and an eye bolt, the stem of which passes downward through the cross bar, K, and is secured and regulated by the thumb nut, K'. Through each end of the cross bar, K, the lower ends of two steel pins are passed. These pins have heads or collars secured on them, so as to be laid hold of by the bar,

K, and be pulled or pushed downward by it when it is forced down by the links, J J. The said pins pass upward through holes in the framework, and their upper ends are tapered so as to enter two rows of correspondingly-shaped holes in steel bars fixed to the under side of the frame, E (these holes, from centre to centre of each, are of the exact pitch required for the dovetails.) Helical springs, L L, are passed over the lower part of the pins, which are there reduced in diameter for that purpose. These springs abut against the ends of the cross bar, K, and shoulders of the steel pins, and have always a bearing against them ready to force the pins into the conical holes in the steel bars whenever the pins and the holes coincide. By these means the frame, E, and table, E′, with the pieces of material (secured on it by the eccentric roller) are prevented from being jerked too far by the action of the pauls in the ratchet teeth, and thus a perfect registering of the cuts of the different cutting bits is secured as the material progresses from right to left, or *vice versâ*, and when the material is reversed or turned upside down. M M are two cutters fixed in a stock by a screw and gland. These cutters are for bevelling the pins which fit into the dovetails. The stock is secured to a sliding bar, which has a horizontal to-and-fro motion imparted to it by a bell crank through a connecting rod, which is suitably jointed to both the sliding bar and the bell crank. The other arm of the bell crank has a connecting rod jointed to it, the lower end of which rod passes down through a socket fixed on the side of the lever, H. A pin is passed through the side of the socket, and through the said connecting rod and lever, H, when the cutters, M M, are brought into action. When it is required to put them out of action, and let them remain at rest, the pin is withdrawn by the lever, *p*, through a rod, which has a curved or circular piece formed on its end, and projecting downward through a hole formed in the head of the pin; the curved piece allows the lever, H, the connecting rod, and pin to move up or down when the pin is passed through the socket, the rod and the lever when the cutters, M M, are in work. When the pin is withdrawn by the lever, the rod, the circular piece, the cutters, with their connections, remain at rest, while the lever, sockets, &c., are still capable of being moved up and down, the pin head traversing on the curved piece on the connecting rod. The sliding bar on which the cutters, M M, are fixed, has a small bracket, N, secured to it by screws. In this bracket two small steel rods, *r r*, are secured by set screws. These rods, *r r*, have the same motion as the cutters, M M, and work through holes formed in the lug, N′, which is formed or cast in a piece with one of the guide pieces in which the sliding bar works. The rods, *r r*, are pointed and roughened, notched or barbed, so that when they move towards the workman their points enter the chips or portions of wood which have been previously severed from between the dovetail pins, and in the backward motion of the cutters and rods, *r r*, withdraw the chips back from between the pins until the chips or waste wood come in contact with the fixed lug, N′, which prevent them getting further, the rods, *r r*, having still to traverse some distance further back, are drawn entirely within the lug, N′, thus freeing the points of the rods from the chips, which are then at liberty to fall through a recess or hole formed in the platform, C, for that purpose. O is an angle-pointed knife or cutter, which is made use of when it is necessary to make a horizontal cut parallel to the table, E′. This knife or chisel is secured to a horizontal sliding bar, P, which is capable of having a to-and-fro motion given to it by a worm, P′, on the circumference of a wheel moved by the handle, Q. The worm, P′, takes in between two suitable teeth formed on the end of the sliding bar, P, opposite to that on which the angle-pointed knife or cutter, O, is secured. The worm wheel is free to turn on a stud or pin fixed in the upright piece, Q′, which is cast or formed on the frame or guides, R R, in which the sliding bar, P, moves. The angle-pointed knife or cutter is regulated in its height or distance from the surface of the table, E′, by raising or lowering the frame, S, vertically, by means of a hand wheel and screw. The guides, R R, are secured or formed on the top or upper side of the frame, S. This frame works in vertical guides secured to the lower side of the platform, C, and to the back frame.

The mode of cutting dovetails is this. The piece of board to be operated on is placed on the table, E′, beneath the lean side of the eccentric roller, and guided to a proper position by the guide or pitch pins, *e e*, inserted and fixed in the table, E′. The guide pieces, F, F, are caused to advance by turning the screw spindle, G, by the handle, until one or both of them embrace the edge of the board. The eccentric roller, *g*, is then partially rotated until its full side jams the board between it and the table, E′, where it is held fast. The cutter bit is secured in the bit stock; the workman then presses down the treadle, H″, which communicates a vertical motion to the bit stock and cutter bits by means of the connections before

described. The cutters enter the wood and are regulated to cut it fully more than half through. By the downward motion of the treadle, the pauls have been drawn forward (by means of their various connections as previously described) until either of them is in a position to lay hold of the required ratchet tooth. The taper pointed steel pins have likewise been withdrawn from their conical holes in the steel bar. The foot of the workman is now eased from the treadle, and the laminated springs come into play, and by means of the requisite paul and the before-described connections, the table, E′, and frame, E, are caused to begin to move. The points of the steel pins are now resting on the smooth steel bars in which their corresponding holes are formed, and ready to be pressed into them by the helical spring the moment they coincide, which is the case whenever the table, E′, and frame, E, has been moved the length of a ratchet tooth. The workman now depresses the treadle again, and brings down the cutters and makes a second cut. The process is continued as long as is necessary, and the board is then released and turned upside down. The same operation is repeated on the second side and the different cuts meet those which have been made on the opposite side, thus completely severing and cutting out the dovetails. To cut out the portions of material between the pins, the same process is repeated as that in cutting out the dovetails, but with different tools; in this case the cutters, M, M, and picking rods, r r, for cleaning out the waste or chips, are brought into play as formerly described. The tools used are varied for effecting the rabbetting, grooving, slotting, &c.

THE ROYAL AGRICULTURAL SOCIETY.

In our notice of last year's meeting of the Royal Agricultural Society, we mentioned the introduction of a new system of prize distribution, which consists in giving prizes to certain classes of implements only at each annual gathering, the three classes —under one of which each description of instrument is included—being taken in rotation. At Chelmsford, last year, the trials were of ploughs, harrows, clod-crushers, cultivators, and other implements used in preparatory tillage; this year they were of drills, horse hoes, hay machines, horse rakes, reaping and mowing machines, carts and waggons, and other apparatus employed in the cultivation and harvesting of crops. Steam ploughs and steam cultivators have also been experimented with.

One of the greatest novelties among this year's implements, is a combined reaper and mower, called the "Eagle," the invention of Mr. A. H. Caryl, of Sandusky, Ohio, exhibited by Mr. Clayton, of the Atlas Works, Dorset-square, whose patent brick-making machine was much approved of at the Chelmsford meeting, last year. Mr. Caryl's machine was highly spoken of by many of the visitors. It is well balanced, and so arranged that the driver, who sits behind (the horses being in front), can depress the rear end of it with his foot, and thus clear impediments which may lie in the way. The cutters reciprocate above the projecting fingers, which are sharp, and move slowly to and fro, being pressed down by a spring, to prevent fouling. The parts are driven by cams and slides, without cogged wheels. When used for reaping corn, it is furnished with a curved platform, and an automatic gatherer, by means of which the corn is laid in bundles in the rear. This machine has received valuable prizes in America, and has gained the first prize, as a mowing apparatus, at Salisbury.

Messrs. Burgess and Key's reaping machine has again received a first prize. This machine, in addition to the Archimedean screws which deliver the crop so efficiently at the side of the platform, has fitted to it a revolving conical roller, furnished with a screw-thread, which brings the standing corn up to the machine. This contrivance, which answers extremely well, has recently been patented by its enterprising inventors.

In order to satisfy numerous gentlemen —practical farmers—of the capability of his excellent reaping machine, Mr. Dray took a machine down specially at their request, and tested it before them in a field of rye on the farm of the Mayor of Salisbury. The crop was light, and during the trial there was a good deal of wind, but the result was of the most satisfactory character. One gentleman, it is said, who had travelled from Cork to purchase whichever machine the judges commended, hearing that Dray's reapers were much esteemed by numerous farmers who possessed them, attended the trial, mounted the reaper, reaped a siding with it, and, being perfectly convinced of its merits, purchased a machine. Mr. Dray did not, however, receive a Society's prize this year, the judges having resolved to show favour only to those machines which are provided with a self-acting delivery.

Several experiments were made on Monday with steam-ploughing apparatuses, but no results sufficient to warrant the award of the prize were attained, although Mr. Collinson Hall's admirable arrangements of engines and ploughs (of which we shall shortly give an engraving) worked remarkably well. We hope we shall have something more encouraging to report after the next yearly meeting at Chester, at which ploughs will be the subjects of the highest prizes.

It may appear strange to many of our readers, but an extensive acquaintance with the manufacturers of agricultural implements has shown us that, however important the awards of the prizes of the Royal Agricultural Society may have been in past times, the business of the maker is now but little affected by the decisions of the Society's judges; indeed, we know that the sale of agricultural machines, by particular makers, is frequently the very reverse of what the judges' awards would lead us to anticipate.

We could scarcely explain this without giving more or less offence to the leading men of the Society, but we have ample evidence that the fact is as we have stated it. Perhaps these gentlemen will condescend to consider whether there exists any just ground for the apparent anomaly, and what that ground is. If they are sincere friends of the Society they will not fail to do so.

FURTHER CONSIDERATIONS ON HEAT AND OTHER IMPONDERABLES.—BY HORATIO PRATER, ESQ.

I propose now to consider the question of the "convertibility" of heat; authors having lately considered that heat, light, electricity, magnetism, chemical affinity, and motion, cannot be said to be the cause of one another, but ought rather to be said to produce or "be convertible" into one another; and that each itself diminishes, as the force it produces becomes greater.

2ndly. Whether, as is likewise asserted, it be "an irresistible inference from facts," that a force cannot originate otherwise than from some pre-existing force or forces; in other words, whether heat cannot *generate or extend itself*, quite independent of this origin from other forces, asserted with so much confidence.

The new theory is, that force is an active principle inseparable from matter; and that, heat, &c., are only *different modes of motion* of the atoms of this matter; and we hear of "efforts of inanimate matter," now, alluded to in very unexpected quarters. One reason why the above forces generally are considered inseparable from matter is, because even by *our best* air-pumps, we cannot, it is said, get a *complete* vacuum. This may be true, and yet scarcely warrants the conclusion, for we find in proportion as air is rarefied, and we get *nearest* to a vacuum, electricity passes more easily; and also that Fresnel (*Annals de Chim.*, t. xxix), found heated bodies repel each other in such a void. The *first* experiment is a common one, and it is easily seen that electricity, which can only pass through a few inches in dense air, passes easily through a foot or two in the void; therefore, although Morgan attempted (many years ago) to show it does not pass in a so-called better void, yet Sir H. Davy (who admits, *Phil. Trans.*, 1822, he himself could not obtain a *perfect* void) placed little confidence in these experiments; and whether correct or not, they do not affect *the fact* above stated; which fact would certainly make us think that in a *perfect* void (*could it be obtained*) electricity would pass STILL BETTER than it does in the best void we can now obtain.

Although, therefore, I do not object to the "efforts of inanimate matter"* being alluded to—for these, now tardily acknowledged, seem certain, whether the above forces be only motion of *matter*, or motion of an ether—yet, I do not agree that electricity has yet been *proved* to be such motion of ponderable matter.

But now let us keep more particularly to motion and heat. In illustration of the doctrine that "force *cannot* be annihilated" (our authors should have spoken with more diffidence) it is said that the heat of friction or percussion is a *continuation* of the *mechanical motion;* in fact, a CONVERSION of motion; this being a sort of vibration of *visible* masses, while heat is a vibration of atoms. We had previously known that motion is a *communicable* property; and also that heat was such. This theory then makes them communicable, or "convertible" into each other, instead of being, as formerly supposed, lost or destroyed. In friction, again, in proportion as the motion is destroyed (or to the impediment) so in the *same proportion*, says this theory, is the heat produced: thus, the one kind of motion is changed into the other.*

If the friction be of *homogeneous* bodies, heat alone is produced; if of *heterogeneous*, electricity, says the theory; but it ought to have added, heat *also*. Thus motion has produced heat and electricity, and this last will produce magnetism, and also says the theory (see remarks further on) *so-called* chemical affinity, for Dr. Wollaston first produced this from frictional electricity. Thus we see that, granting the "inherent activity" (see my Essay), or motive power, to atoms, you may get heat, electricity, magnetism, chemical affinity, light (for this sometimes comes from friction, sometimes from electricity or *rapid* combination) as the case may be.

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* Our very conscientious author, like some other Fellows of the Royal Society, has borrowed a good deal from the *Mechanics' Magazine*, without acknowledgment; yet the disputes in the *Phil. Mag.*, about priority, are almost endless. It is a pity he did not borrow even a little more from my "Essay on Inherent Activity" and other essays, as, if I be not mistaken, it would have made his work more true to nature.

* Mayer showed that even liquids produced heat by friction: and certainly in friction generally the "conversion" theory is plausible, as in proportion to the resistance is the heat. But even here it may be said that *resistance* may be regarded almost as much an *increase* of mechanical motion as a stoppage of it in *one* sense, since it requires *more initial* moving force to overcome it. The greater the friction, the greater the heat; and when the *friction ceases*, the heat gradually declines. But on the conversion theory, it surely ought to be much greater when the friction has altogether ceased.

"The *greater the force* required to overcome the friction, the greater the heat, which is a *continuation* of this indestructible force." This is the new theory summed up.

When our authors come to heat, as they find this, if in excess, imparts a painful sensation to animal bodies, they have a difficulty in their theory which regards it *as nothing else* but motion. The motion of atoms of water at 180° only, cannot be so *very* rapid (even supposing rapid motion able to cause pain), and yet the hand cannot remain in water so heated. Still less can the contact of a mass of metal at a dull red heat be supposed to give the hand pain by any power like rapid motion of atoms ponderable.

Another objection to the *mere* motion theory of heat I may here state, is, that the supporters of it have, as I first observed, tried to prove that we cannot get a *real* vacuum, and they admit, if we could, and if electricity and heat were communicable in it, that they must give up their theory, as then electricity and heat could be communicated *without any intervening atoms;* and matter would then, in fact, be able to *act where it is not.* To my mind, however, the fact of great heat causing pain is a stronger objection to their theory than the last.

Heat, then, according to their definition, is merely a dilating power which (like that of ordinary motion) is COMMUNICABLE by contiguity or proximity; or as they should, I think, rather have added, *direct contact*, for, as just stated, one of their leaders goes on this theory, by denying that we can get a perfect void.*

They attempt to explain *latent* heat on their view in a way which seems not satisfactory; but the actual expansion of water, fused bismuth, &c., as they approach the freezing or solidifying point, is still more difficult on the theory of heat being mere communicable expansive power. Authors have pointed out a *final* cause for this expansion in the case of water becoming ice, which probably should not be forgotten, since as final causes most probably operate in organic matter, the Deity may think fit to make them do so in the case in question. I, however, admit the *physical* cause of this expansion is almost as difficult to conceive on the materiality theory of heat as on the mere motion theory, and leave it for future inquirers.

But the attempt to support this last theory, by saying heat cannot be separated from matter, though plausible, is not so strong an argument as it seems; for we have already seen "heated bodies repel each other in vacuo," so the *matter* of heat passes between them in the best void *we can* get, and it is a sort of subterfuge to say, it would not, if the void *were perfect*, for this *neither* disputants can prove. "The *thing* heat," says one over wise, "cannot exist alone."* No, of course it cannot, because, by his own confession, we cannot get a *perfect* void. Let our mechanics *improve our instruments*, and *they* then will decide the case for us. It will be worth their while to settle what we cannot, and thus gain the prize.

Mere approximation (*without contact*) of metallic discs of different metals has lately been shown, by two different observers, to produce electricity (*Philosophical Magazine.*) But it is surely very difficult to conceive that *solid atoms* are set in motion to produce the force in question, but easy to suppose the *ether* presumed to pervade matter is so set in motion.

Mere *approximation*, too, produces Möser's images; so that by these two different effects we seem to see something very like (at all events) to what is called sympathy in living bodies. In fact, it is going something *beyond* Berzelius's catalytic force; for here *actual contact* (as *clean* platinum with hydrogen and oxygen) seems necessary to produce the still marvellous result.† But in *sympathy* matter acts *where it is not*, and without actual contact; and in living beings in proportion to the sensitiveness or sensibility of the different parties. Now, then, at all events we have discovered that this *mere presence without contact*, acts on inanimate matter (though far less perceptibly) as well as on animate matter. But our leading motion theory of heat philosophers have not perceived, or have forgotten this fact. Yet it is not more against them than against the ether theory of heat; but it certainly is against that leading part of them, who try to prove we cannot get a void, because they think if heat be only motion, it must be propagated by INTERVENING atoms.

(*To be continued.*)

* He does not seem to adopt the universal ether theory. Of course, those who adopt this *never* will get a perfect void, though our air-pumps be ever so much improved.

* These gentlemen will admit heat to be nothing else than motion, because as they say this motion (which is certainly not a fluid) is converted into heat, *nothing would be converted into something*, if the nothing motion, produced the something, heat. This heat, then, is nothing, that is, only motion. A rigid species of *Epicureanism* this, "Ex nihilo nihil fit."

† A good attempt to generalize these phenomena and refer them to *Allotropism* has lately been made by Prof. Schönbein (*Poggendorff's Annalen*, Translation, 1857). Among a vast number of facts, he states the following most extraordinary. Atmospheric oxygen, which has had phosphorus in it some time, produces, *even after the removal of the latter*, all the oxidations which it produced during its presence. Electricity (which causes a similar change in the condition of oxygen, without the assistance of any ponderable matter) also in this way effects all the oxidations which oxygen altered by phosphorus can produce even *after the electrization has been discontinued.* Thus, says he, the catalytic influence of phosphorus and electricity consists in an "*allotropic*" change, and the *contact* of platinum also seems to effect a like change on oxygen; for he finds that after such contact, the oxygen turns tinct. guiacum blue, and bleaches moist indigo coloured paper.

GUTTA PERCHA PATENTS.

VICE-CHANCELLORS' COURTS,
JULY 27.
(*Before Vice-Chancellor Sir* JOHN STUART.)

BEWLEY *v.* HANCOCK.

THIS was a motion for an injunction to restrain the defendant Charles Hancock from holding himself out by advertisement or otherwise, under colour of letters patent, dated 20th of November, 1845, granted to him for Scotland, in violation of a certain agreement dated the 31st of May, 1845, as possessing the sole right to manufacture gutta percha, or articles composed thereof, and from otherwise dealing with such patent in derogation of, or in opposition to, any or either of the several patents compromised in and subject to such agreement and the rights thereby conferred on the plaintiff and the several persons interested under the same agreement. By an agreement dated May 31, 1845, and made between Messrs. Nickels, Keene, Hancock, and Bewley, it was agreed that all patents taken out, or in the course of being, or intended to be, taken out, or that might at any time thereafter be taken out, by any or either of the parties thereto, in relation to the preparation and application of gutta percha or gutta tuban, or the manufacture of any articles therefrom, should be assigned to trustees for their common benefit. By a decree of this branch of the court, dated June 24, 1855, and made in a cause of "Bewley *v.* Hancock and others," it was ordered, among other things, that the defendant Charles Hancock should be restrained from holding himself out, by advertisement or otherwise, under colour of letters patent for England, dated the 15th of May, 1844, for an invention, entitled "Certain improvements in cork and other stoppers, and a new composition or substance which may be used as a substitute for and in preference to cork, and a method or methods of manufacturing the said new composition or substance into bungs, stoppers, and other useful articles," in violation of the before-mentioned agreement of the 31st of May, 1845, as possessing the sole right to manufacture gutta percha, or articles composed thereof. The defendant Hancock appealed from that decree to the Lord Chancellor, but such appeal was dismissed with costs. The present bill alleged that the defendant Hancock, on the 20th of November, 1845, obtained letters patent for Scotland for the same invention as that for which he had obtained the before-mentioned letters patent, dated the 15th of May, 1844, for England; and that the plaintiff had recently discovered that the defendant Hancock, under colour of the letters patent of the 20th of November, 1845, and in violation of the agreement of the 31st of May, 1845, had been holding himself out to numerous persons in Scotland, and in particular at Glasgow, to various persons who had been hitherto in the habit of dealing with the plaintiff as possessing the sole right to manufacture gutta percha or articles composed thereof, and that the defendant had been otherwise dealing with the letters patent in Scotland in derogation of the rights of the plaintiff and of the other persons interested under the agreement of the 31st of May, 1845.

The Attorney-General, Mr. Bacon, and Mr. F. W. E. Stiffee appeared for the plaintiff; and Mr. Malins and Mr. G. M. Giffard for the defendant Hancock.

The Vice-Chancellor said he thought that the plaintiff was clearly entitled to an injunction in the terms asked, and made an order accordingly.

RUSSELL'S PATENT STOVES.

MR. R. RUSSELL, of the firm of Fowkes and Russell, of Derby, has patented an invention which consists principally in placing within an outer case a fire dish or fire basket intended to contain the ignited fuel, and so fitted that rotary motion may be communicated to it, whereby the fuel is worked about, ashes &c. are shaken down into the ashpit or cinder tray beneath, and (in stoves of the description called self-feeding air stoves) sticking of the fuel and choking of the feed passage are prevented. The fire basket is formed with perforated sides, or with openings all round it, and the stove case has openings all round it, into which talc is inserted, so that the fire may be seen on all sides of the stove, whereby a cheerful appearance is imparted. The openings in the case may be provided with sliding plates (fitted with talc or not) for regulating the draught.

The annexed engraving is a vertical section of the improved stove. A is the fire dish, composed of a number of grate bars, with sufficient openings between them for the admission of air. These bars may be fixed at their tops to a ring, B, and at their bottoms to a plate, C, having a pivot, D, formed or cast on it. The pivot, D, is inserted in a hole in the plate, E, in which it is free to turn. F is a piece cast or otherwise formed on the fire dish, in which piece there is a hole formed or drilled of a sufficient size to receive the end of a bar, which may be passed through a slot in the side of the stove for moving or turning the fire dish. A pin or projecting piece, F′, is formed on the fire dish, A. which abuts against a fixed piece or pin, G′, in the plate, E, so that when the fire dish is moved smartly, a shock

is given to it, which causes the fuel to descend and the ashes to fall through the fire dish grating. The fire dish may be cast in one piece, and have openings cored out so as to form the bars in the dish itself. H is a plate underneath the plate, E. The plate, H, has holes formed in it, and is capable of being moved or turned partially round, so as to bring its holes in a position to coincide with similar holes formed in the plate, E. Air is thus admitted to the space in which the fire dish is placed, and from thence through the openings in the fire dish to the burning fuel; the plate, H, may be fixed on the lower end of the fire dish pivot, D, if desired, or it may be loose, and capable of being moved or turned independently. To shut off the air, the plate, H, is moved or turned into a position so that the holes in the plate, H, will not coincide with those in the plate, E, and communication will consequently be cut off between the ashpit, I, and space, J, in which the fire dish is placed; or instead of regulating the air by the plates, H H, it may be regulated by a ventilator placed in the drawer front of the ashpit. K K is an enclosed space between the fuel hopper, M, and the external case, and is closed at top by an annular lid or cover, L, secured to the casing; and round the fuel hopper, M, this space acts as a fuel chamber and hot-air case, from which the heat is radiated through the apartment. A flue pipe carries the remaining smoke and gases to the chimney. The fuel hopper, M, is closed by a cover, which is fitted so as to be easily removed when a fresh supply of fuel is required. The hopper, M, is made conical, with its greatest diameter placed a little above the fire dish, A. This arrangement allows the fuel to sink gradually as it burns away. The hopper, M, is composed of two parts, which are joined together at *a a*. The upper part is of sheet iron, and the lower part, N, of cast iron, of considerable thickness at its lower edge, so as to withstand the intense heat which is produced at this point. To serve the same purpose, the interior of the casing, P, is made thicker, and shelving inwards all round. The sides of the casing, P, from *b* to *c*, may be perforated, or slotted holes may be formed in them, and in the perforations or slots pieces of talc may be inserted, so that the fire may be seen from all sides, whereby a cheerful appearance is imparted.

WHEELER'S METHOD OF CONVERTING ROTARY INTO RECIPROCATING MOTION:

ESPECIALLY APPLICABLE TO MACHINERY FOR FORCING PLASTIC SUBSTANCES THROUGH MOULDS AND DIES.

Mr. J. Wheeler, of Wootton-under-edge, Gloucester, has patented the following apparatus for the above purposes. At the bottom of, or upon a shaft, he fixes a toothed wheel; the shaft rotates in fixed bearings. In a frame connected with, or forming part of, the instrument to which to-and-fro motion is to be communicated, he places pins, held loosely between top and bottom plates. These pins and plates form a two-sided rack, into which the teeth on the wheel gear. A stud projects from the bottom of the under plate at each end; and on the pins and plates being shifted from one side of the frame to the other, these studs follow guides in or on the bottom of the frame. Upon rotary motion being imparted to the shaft, and the double-sided rack being in gear therewith, the toothed wheel drives the rack, and consequently the whole instrument, forward, until the last pin in the rack is presented to the wheel, when the wheel revolving in fixed bearings turns the rack over, gears into the pins or teeth on the opposite side thereof, and drives it and the whole instrument in the direction opposite to that in which it had been first propelled, and so on continuously.

When applied to the forcing of plastic substances, the shaft of the pug-mill may be prolonged into a frame beneath, fitted with the aforesaid appliances, pistons or plungers being connected to each end of

the instrument, and suitable cases for containing the plastic materials with dies or moulds in the face thereof being provided and being fed from the pug-mill, the to-and-fro motion imparted to the pistons would cause them alternately to press the plastic substance through the dies.

In the engravings annexed is shown the method of converting rotary into reciprocating motion, applied at the bottom of a pug mill to the forcing of plastic substances through moulds. Fig. 1 is a

Fig. 1.

Fig. 2.

sectional elevation of the apparatus, and of a pug mill; and fig. 2 is a sectional plan of the motive parts, with pug mill removed. A is a covered box, capable of to-and-fro motion in the case B. Arms C C project from each end of the box A, and are furnished with moulding pistons D D.—E is a rack shown separately in side elevation at Fig. 3. The two end pins, *a a*, forming part of the rack, project downwards through and beyond the bottom plate, *b*, and travel against the guide pieces, *c c*, fixed on the bottom of the bag, A, and shown partly in dotted lines in the plan, fig. 2, *d d*, are abutments against which the ends of the plates forming the rack are alternately carried to propel the box. The rack itself is caused to move in the manner before stated to the rotation of the toothed wheel, F, fixed on the bottom of the shaft, G, which revolves in a fixed bearing, H, and which being prolonged upwards, forms also the pug mill shaft to which the blades, *e e*, are fixed. I is a bevelled two-third wheel for communicating rotary motion to the shaft, G, and toothed wheel, F. K K are spouts for the passage of the clay from the mill into the case, B, in front of the moulding pistons, D D. The moulds are held at the ends of the case at L L.

NEVILLE'S PATENT APPARATUS FOR ANNEALING GLASS AND FIRING POTTERY WARE.

Mr. S. Neville, of Gateshead, has patented an invention which consists in arranging a number of lear pans (or plates or vessels for holding articles to be annealed or fired) in the form of an endless table made to travel and convey the articles through the lear at the desired rate of speed, and return to receive a fresh charge without being removed from the lear.

Fig. 1 of the annexed engravings is a sectional elevation of his improved apparatus shown inside a kiln or lear, and fig. 2 is a plan of the same with the brickwork in section. A A′ are two shafts which turn in bearings in the brickwork, B B; on the shafts, A, A′, cylinders may be fixed, or instead of cylinders polygonal castings as represented at C, C, over which the endless chains, D, D, pass. The lear pans or plates, E, E, are secured to the chains, D, D. The requisite motion is communicated to the chains and pans by one or other of the shafts, A or A′ being caused to rotate by a winch handle or otherwise. F is the lear in

which the endless chains and pans are set; G, G, are rollers over which the chains and pans travel and are supported. The articles to be annealed are placed on the lear pans

Fig. 1.

Fig. 2.

or plates, E, which being made to travel slowly in the direction of the arrows, convey them to the opposite end of the lear, whence they are taken off. The invention is susceptible of modification.

Reports of Cases relating to Letters Patent for Inventions: Decided in the Courts of Law and Equity, and before the Judicial Committee of the Privy Council; with Notes of Applications for Amendments, Leave to Enter Disclaimers, &c., &c. By Edmund Macrory, Esq., of the Middle Temple, Barrister-at-Law. Parts I. and II. London: W. G. Benning and Co., 43, Fleet-street. Boston, U. S.: Little and Brown. 1857.

No author can possibly have had a better training for the preparation of a work of this kind than Mr. Macrory. Engaged for several years in studying the nature and operation of the Patent Laws under so able a master as Mr. Hindmarch, the author has had the most favourable opportunities that could be desired for the efficient preparation of such Reports as these before us. Having, at the same time, brought no ordinary amount of knowledge and acumen to his task, we have to express unqualified praise of his work, the first part of which has already been referred to as authoritative in the Law Courts.

It is not an easy thing to set forth the merits of a work of this kind. It is, however, evident that they lie chiefly in the judicious selection of the cases reported, and in giving a careful and just digest of the evidence and allegations recorded on both sides, and of the decisions of the tribunals. In every case reported in the two Parts before us some points of importance are involved, and each Report is so constructed as to give due prominence to those points. The work will, therefore, become of the highest value to every person engaged in any way in the practice of Patent Law, and even by the patentee, or the mere inventor, will be found to throw much light upon subjects of deep interest to him. The Reports are prepared with no more technicality than is absolutely necessary, and may be read with pleasure by every man who, with ordinary capacity, has a desire to learn the relations in which patentees stand to each other, and the manner in which patent rights are guarded and secured by the law. We cordially recommend the work to our readers.

Abridgments of the Specifications relating to Marine Propulsion. Part I. Printed by Order of the Commissioners of Patents. 1857.

We are at liberty, we believe, to state that this little volume has been prepared by J. Macgregor, Esq., of the Inner Temple, Barrister-at-Law, the author of the excellent work on the "Language of Specifications of Letters Patent for Inventions," noticed at page 33 of our sixty-fifth volume. We mention the author of the volume before us, because the amount of research of which it gives the results is very considerable, and reflects great credit upon the compiler. It would be easy for the gentlemen entrusted with the preparation of these volumes of Abridgments of Specifications of Patents to overstep legitimate boundaries,

and send forth under the authority of the Commissioners of Patents, statements of a doubtful character, and speculations of a rash or whimsical kind. But Mr. Macgregor confines himself to a few introductory words of unquestionable accuracy, and to the quotation of authorities in foot notes. He thus gives us the benefit of his researches, unalloyed with opinion and conjecture.

In the Part before us (Part I.) the Specifications are brought from the first patent in January, 1618, (in which D. Ramsey and T. Wildgosse propose "to make boates for the carryage of burthens and passengers runne upon the water as swifte in calmes and more saff in stormes than boates full sayled in great wynes") up to the specification of Mr. R. Witty's patent of 1830.

We have one fault to find, however, with this volume on "Marine Propulsion," and we mention it chiefly in order to remove a misapprehension that will occur to some persons. On page 5, at the end of a foot note, we are casually informed that "the inventions relating to sails are not included in this compilation of Abridgments, but will be detailed in a separate series." This is not proper. Either the inventions relating to sails should have been given, or the volume should not have been headed "Marine Propulsion," which evidently includes them. At any rate, the discrepancy ought to have been pointed out more prominently.

We are pleased to see these Abridgments appearing rapidly, and hope Mr. Woodcroft will continue to urge them forward with all possible speed.

Personal Narrative of the Origin and Progress of the Caoutchouc or India-Rubber Manufacture in England. By THOMAS HANCOCK, of the Firm of Charles Macintosh and Co., London and Manchester. With Engravings. London: Longman, Brown, Green, Longmans, and Roberts. 1857.

IN his preface to this exceedingly interesting and valuable narrative, Mr. Hancock says: "This humble relation is in no respect to be considered a treatise on caoutchouc; it is simply an account of my own progress in the manufacture—feeling conscious that no one had preceded me in this path, or I should not have assumed as much in the title-page.

"This claim is not of recent date, as my patents will show, and the notices of my manufactures from time to time in the *Mechanics' Magazine*, established in 1823 by the late Mr. Robertson, who many years ago honoured me in that periodical with the title of 'Father of this important and wonderfully increasing branch of the arts.'"

In these remarks Mr. Hancock is much too modest; for his book is more than he here represents, and constitutes, indeed, the best account yet published of this very important manufacture.

It is not our present purpose to give anything like a summary of the contents of the volume before us, in the first place because we have not the necessary space for the purpose, and in the next because no summary that we could give would convey any fair sense of the interesting details with which the work abounds. It really is surprising to observe the indefatigable exertions made by Mr. Hancock to discover the true properties of caoutchouc, in order to produce some efficacious mode of adapting it to the variety of purposes to which it is applicable, and which he from the first evidently foresaw.

It is now about thirty-eight years since he first directed his attention to the subject; and all who peruse the volume before us will see that Mr. Hancock has had the same upward and toilsome path to traverse which generally lies in the track of those who are destined to confer great and lasting benefits upon the world at large. It has seldom fallen to the lot of one individual to make such advancement in one particular branch of manufacture as Mr. Hancock has made in this. A few years since, the almost sole use to which India-rubber was applied was the erasure of pencil marks, whereas we now find it in universal demand for articles of innumerable kinds.

Of course, Mr. Hancock has not directly applied it to all the purposes for which it is now advantageously employed (although he has to many), but his discoveries have been the cause of its application. He saw at the outset that a good and perfect solvent was indispensable, and after repeated experiments he succeeded in producing one; this may be considered the first great and important step towards bringing the India-rubber manufacture to its present state of perfection. The next important feature in Mr. Hancock's progress was the invention of the machine called the "Masticator," by means of which, separate pieces of the material are caused to adhere so as to form a solid mass, without the adhering surfaces being newly cut, and without the aid of a solution. It was the combined effect of these two discoveries which brought this

manufacture to the advanced condition it attained previous to his discovery of the process termed "vulcanisation." With reference to this last process, we have already published elaborate articles, to which we need not here add.

We will only further state that the author has appended tables of the exports and imports of caoutchouc for several years past, together with an account of the trees from which it is obtained, the districts in which they are found, &c.; also copies of the specifications of his various patents. The work is beautifully illustrated, and thus rendered complete. We recommend all who meet with the volume to read it; for irrespective of the interesting and instructive matter contained in it, it cannot fail to produce a good result by demonstrating how much can be accomplished by having a sound and fixed purpose in view, and a determination to pursue that purpose with untiring energy.

THE HYDRAULIC PILE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Herewith I send the second sheet of drawings, showing the landing-stage I projected for St. George's Pier, Liverpool, fourteen years ago.

I do not deny Mr. Edwin Clark the merit of applying the plan to ship-lifting in these New Thames Graving Docks; all I claim is, the entire originality of showing how hydraulic power could be applied to bridge or platform elevating some time before the Menai Straits tube was constructed. To be brief, I claim the *modus operandi* by hydraulic "columns" (as they are now termed, but hydraulic "PILES," as I termed them.)

I called these columns "piles" because they were to be driven into the bed of a river without excavation, precisely after the manner of our ordinary piles. To employ a simple illustration, it would be like a boy pushing the lower portion of a syringe into wet sand (the piston, &c., being added afterwards.)

But there is a letter in the *Mechanics' Magazine*, No. 1768 (June 27th), from Mr. Thomas White, jun., making a statement which apparently throws both myself and Mr. Clark quite "out of court."

You remember I claimed the "principle" of platform-lifting adopted by Mr. Clark at the Menai Straits, and also at the New Thames Graving Docks; but Mr. White says:—"The lifting part of Mr. Clark's apparatus is simply the principle of Evans' hydrostatic dock, patented at New York in 1831 (see Weale's Quarterly Papers on Engineering, Lady-day, 1845, Part 7.) The patent for England was bought by Mr. Pitcher, who had elaborate working models sent over (? where to!) but not *answering in America*, it made no way *here*." Now it is true two persons may invent and re-invent the same thing, but I have seen so many things claimed for America in opposition to this country, that I do hope there are no "*Mrs. Harrises*" residing on the banks of the Mississippi!

You will observe Evans's patent is stated to be 1831, yet it is only described in England in 1845, fourteen years after its invention; and—rather curious coincidence!—the year 1845 is subsequent to the competition for the Liverpool landing-stage.

As Mr. White has his authorities by him for Evans's hydraulic wharf (which I never heard of till now), perhaps he will kindly oblige us with a quotation.

The reason I made a stir in this matter arises from the fact that I have derived great encouragement and increased confidence from the proceedings of so eminent an engineer as Mr. Edwin Clark.

I am, Gentlemen, yours, &c.,

CHARLES BURCHAM.

8, Upper John-street, Golden-square, W.

[The following description of Evans' dock is taken from the work referred to by Mr. White:—"The hydrostatic screw dock is a slip abutting on the shore with a suspended keel, allowing the vessel to be raised up vertically, instead of being drawn up on an incline, as in Morton's slip and the marine railway. It consists of two outer and parallel ranges of piling, each bearing away at the top, from which are suspended chains, to which are slung transverse bearers or swing beams, over which the vessel to be docked floats; and, having arrived over this moveable platform or grating, the chains are raised by means of Bramah's hydrostatic press, and the vessel brought to the level of the permanent way. The means by which the apparatus is worked are ingenious, and constitute the chief merit of the application." It should, however, be understood that Mr. Evans did not propose to use hollow piles furnished with pistons, &c. —EDS. M. M.]

THE IRON TRADE, PAST AND PRESENT.—Mr. Richard Cort has forwarded to the *Mining Journal* a large amount of valuable statistical information, showing the gradual and enormous increase which has taken place in the iron trade in the last half century. It appears that the export of British iron of all sorts and steel during the thirty-eight years ending 1829 amounted to £30,311,025; whilst in the twenty-seven and a half years following, five times that value was exported, or to the amount of £149,664,320; making a total for the sixty-four and a half years of nearly £180,000,000.

LOWERING SHIPS' BOATS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Had "Spectator," in your last week's number, but continued the narrative of Captain Kynaston and his doings at Devonport, the public would not have been long in arriving at the true merits of the Captain's "proposed amendments," or at the motive that in his pamphlet, under the false but specious title of a "review of the *different methods* of lowering boats," &c., dictated only a direct attack on Clifford's. As, however, "Spectator" may not have seen what occurred, I will take up the story where he ended it.

The boat having been duly fitted in the dockyard with Captain Kynaston's apparatus, a day was fixed on for a trial from a small steam tug, the *Zephyr*, of about the same size as our river passage boats, before Admiral Parker and a number of naval officers, many of them friends of the Captain's, or personally known to him, (he being a resident in the neighbourhood). On the second lowering by the "proposed amendment" from this tug, when at half speed (about four knots), Captain Kynaston, assisted by another captain, lowered the boat, which was nearly filled with water; anticipating an immediate capsize, Mr. Mills, the master attendant of the dockyard, with a number of men, rushed to the boat hanging at the opposite quarter of the steamer, and fitted with Clifford's plan, lowered it instantly with all hands in it, and went round to the captain's assistance. The captain was fortunately not capsized, and to save himself the chance of being so afterwards, in one or two subsequent lowerings made under similar circumstances of speed, *neither he nor his friend went into the boat.*

To show the prevalent feeling, even prior to the trial, I must state that a goodly supply of life-buoys, &c., for saving life was at hand, although, when Clifford's was tried under far more severe tests, nothing of the kind was thought of. It should be borne in mind, that the proof given on this occasion of the comparative merits of the two plans was purely accidental, and occurred in one of those very positions when Captain Kynaston says his will work and Clifford's will not; and it is since this palpable instance to the contrary that he has written his pamphlet.

But to the finale. Shortly after report of this matter was made to head quarters, direct instructions were sent from the Admiralty to all the dockyards (see the *Times* and *Mechanics' Magazine*), "that all transport ships were in future to carry two boats, fitted on *Clifford's plan.*" These boats, so far from being what Captain Kynaston states Clifford's means of lowering is only fit for, viz., light quarter boats, have been 28 and 30-feet cutters, or heavy life-boats; and it is from trials *at sea* with such that the reports sent into the Admiralty have been made from the *Himalaya, Indus, Princess Royal, Megæra*, and *Shannon.* Clifford's lowerings from the *Dee* when under steam, in a boat with a crew of ten men, in the gale of January last, when the *Northern Belle* and Margate lugger were lost, and from the *Himalaya* with seventeen men, and from the *Princess Royal*, and from the *Shannon en route* to the Cape, recorded only last week, with scores of like instances, are now notorious facts; as also the admission by Sir C. Wood and Admiral Berkeley in Parliament, "that on every occasion of its application its use had been attended with complete success." Captain Kynaston's affair is also as well known at the Admiralty, and it is from facts and not from theories advanced "in an agreeable manner," but with an individual object, that we must form our conclusions. Mr. Clifford is still alive; when Captain Kynaston has gone through only half what he has, *personally*, it will be quite time enough for him to talk about "practical knowledge," the evidence of the result of which he certainly did not display, when he had a fair chance, either to the satisfaction of his own friends, or to that of

Your obedient servant,

An Eye Witness.

THE TILLAGE OF LAND.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Some years since I made an assertion, in which I have ever since persisted, viz.: That I could till land very cheaply by steam power, certain "conditions" being first complied with by the farmers; and that I could hoe or sow an acre of land in five minutes of time, with or without the aid of steam, &c. In consequence of this assertion I have been rejected and thrown overboard by all our most prominent agricultural improvers, right up to the present time. Yet I can do all I state, for a' that, and am only awaiting the *friend* to aid and the opportunity to be afforded.

I am, Gentlemen, yours, &c.,

Charles Burcham,
Projector of Circular Tillage.

8, Upper John-street, Golden-square, W.

MR. PRATER ON SOUND.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In your number for this week is resuscitated a theory of sound, in which the theorist, after thirteen years of painful study, part of the time having his head "covered" (that is, under a cloud), makes the following additions to the groundwork laid in 1844:

First. Because sound can pass through his head and other "very dense solids," and light cannot, he infers that sound is more penetrative than light, and "consequently" different from light.

Secondly. Because sound requires air for "its very existence," therefore it is a thing of life.

As a finishing stroke to this masterpiece of inductive reasoning, he exhorts his readers to make experiments themselves, while he "walks humbly in the track of the Newtonian ether."

Why does not Mr. Horatio Prater come from behind Newton's back and make experiments himself as a base whereon to raise his theories, as the talented author whom he calls in question for his views of the subject has done with so much ability and success?

I am, Gentlemen, yours, &c.,

F. H. H.

London, July 27, 1857.

P.S. I suppose no one will object to "allow that he has not proved his point."

MISCELLANEOUS INTELLIGENCE.

ATLANTIC SUBMARINE TELEGRAPH.—The manufacture and stowage of the cable being completed, the conclusion of the labour was celebrated last week at a *fête champêtre* at Belvidere-house, the seat of Sir Culling Eardley, near Erith. At the conclusion of the dinner the usual loyal toasts, and speeches expressive of the amity and cordial feeling which exists between this country and America followed, and were most enthusiastically received. Mr. Cyrus Field read a letter from the President of the United States, in which Mr. Buchanan warmly expressed his sense of the honour which it would be to him to receive the first message on the completion of the undertaking; and this it had been arranged should be sent from this side of the Atlantic by no less a personage than Her Most Gracious Majesty. Mr. Glasse, the maker of the Greenwich half of the cable, in a few brief and well chosen remarks adverted to the manufacturing difficulties which had to be overcome in the completion of such a gigantic work within so brief a period, the contract having only been made last January, and 2,600 miles in all being now finished, shipped, and ready for the fulfilment of their great international duties. It has been thought advisable to alter the arrangement by which the cable was to have been joined in mid-sea. Now the plan is, to submerge the whole cable in a continuous line from Valentia Bay to Newfoundland. The *Niagara* will lay the first half from Ireland to the middle of the Atlantic; the end will then be joined to the other half on board the *Agamemnon*, which takes it on to the coast of Newfoundland. During the whole process the four vessels will remain together and give whatever assistance is required. While it is being laid down messages will be sent back to the coast of Ireland reporting each day's progress, and if necessary, of course, each hour's.

NEW METHOD OF TEMPERING STEEL CUTTERS.—Mr. R. Burn, engineer, Castle Mills, Edinburgh, is now extensively using the oil of the Sea Island cotton in tempering steel for envelope dies and other kinds of steel cutters; and the success with which the processes of hardening and rendering these very useful articles serviceable has been tested by long and severe trials with a great variety of cutters, many of which are of a size that would have rendered it difficult to secure such a result by any other process. Some of these dies have been fitted to a malleable iron plate, and, with the assistance of an hydraulic press, fifty sheets of paper may be cut into 800 envelopes at one stroke. Tin, cloth, and india-rubber are also cut with equal expedition by machinery constructed for the purpose of cutting out shapes of every variety.

THE CORNWALL MINING SCHOOL AT TRURO. — The second session of this institution having terminated, the pupils have been publicly examined by Warrington W. Smyth, Esq., M.A., Professor of Mining and Mineralogy, at the Government School of Mines, Jermyn-street, London. The following is an extract from Mr. Smyth's report:—"Truro, July 2, 1857.—Sir,—Having had the opportunity of testing the results of the instruction given during the second year of your Mining School, I have great pleasure in expressing to the governors my assurance of the great progress which has been made by most of the students. In the Rev. Mr. Hobson's department, examination papers were prepared on algebra, trigonometry, mechanics, hydrostatics, and pneumatics, and the theory of the steam engine, in all of which subjects a large proportion of the answers was well and correctly given. Thus far, with the majority of the pupils, an excellent effect has been produced by the school. Its sphere of uti-

lity ought doubtless to be much enlarged, and you have already recognized the desirability of establishing local schools in the mining districts in connection with the Truro Institute. But a difficulty lies in obtaining competent teachers. A school like yours ought, it appears to me, to be fostered as a source for the supply of teachers cognizant of what is required by the class of working miners. I look with great suspicion upon any scheme which might have the effect of weakening the practical skill of our worthy miners, or even diluting it with a superficial show of learning; and for this reason may advocate the cause of a school inculcating, as yours has been doing, a good groundwork of scientific principles."

SPECIFICATIONS OF PATENTS RECENTLY FILED.

LORD, J. *An improved admixture or compound to be employed as a substitute for oil in the treatment of animal wool preparatory to carding.* Dated Nov. 19, 1856. (No. 2732.)

To one quart of vegetable oil are added three quarts of water, with about four ounces of crystallised soda, or other similar alkali, and mixed in a cold state for use.

NEWTON, W. E. *An improvement in centrifugal pumps.* (A communication.) Dated Nov. 19, 1856. (No. 2734.)

The object here is to obviate unnecessary friction, occasioned by the changes in the direction of the water that takes place in centrifugal pumps. To effect this the water is made to pass through the pump in the direction of a spiral of gradually diminishing pitch.

HINDLE, T. *Improvements in the manufacture of textile fabrics.* Dated Nov. 19, 1856. (No. 2735.)

This relates to cross weaving in which certain of the warp threads are at periods required to be moved transversely, so as to cross adjacent threads, and this motion is effected by a positive direct action of heddles or harness. The arrangement cannot be described without engravings.

WATSON, G., and C. SATTERTHWAITE. *Improvements in the manufacture of fire-lighters.* Dated Nov. 19, 1856. (No. 2736.)

This consists in the use of wood turnings, or dried peat, combined with resin and tar, to bind the wood turnings or peat together, and render the mass more inflammable.

WATSON, A., and A. H. WILLIAMS. *An improved cap or top for scent bottles.* Dated Nov. 19, 1856. (No. 2738.)

This consists in making perforations in the upper surface of the cap or top, which, on being turned, open up or shut off communication with the interior of the bottle, whereby scent may be sprinkled or inhaled without taking off the caps.

FOX, S. *Improvements in machinery for drawing wire and tubes.* Dated Nov. 19, 1856. (No. 2739.)

The chain to which the plyers are attached passes under a guide, and then ascends and is made fast to a pulley on an axis above, and its end is fixed to such pulley. The axis receives a constant rotary motion, which gives motion also to the drum on which the wire is wound. Other contrivances are included.

MILLY, L. A. DE. *Improvements in the manufacture of fatty acids.* Dated Nov. 19, 1856. (No. 2740.)

Claims—1. The acidification of fatty bodies by the use of lime or other alkalies, or of metallic oxides in reduced quantities, under high pressure. 2. The use of copper for the construction of heating vessels in which the chemical action is produced, or of iron lined with lead or copper. 3. The employment of the agitation of steam for effecting a combination between the fatty bodies and the lime. 4. The production of glycerine in an apparatus acting under a high pressure. 5. The discharging the contents of the heating vessel by the pressure of steam. 6. The heating the vessel internally, and the elevation of the pressure of the mixture by a jet of steam produced in a separate generator.

FOX, S. *Improvements in treating steel wire and tubes, also ribs and stretchers of umbrellas and parasols for hardening, and in apparatus for straightening wire and tubes.* Dated Nov. 19, 1856. (No. 2741.)

Here the steel wire and tubes, &c., are placed in cylinders or tubes of iron, &c., having formed thereon rings or projections. The furnace has a door at each end, is heated by a fire at one end, the chimney being at the other end. The heat and flame are reverberated by the roof down on to the bed, which is made with channels from end to end, on the upper surfaces of which the cylinders or tubes are placed, and are rolled from the front to the back end, where they are taken out, recharged, and introduced at the front end of the furnace.

GILBERT, J. M. *Improvements in certain machines for etching or engraving.* Dated Nov. 20, 1856. (No. 2743.)

This relates—1. To Taylor's Pentagraph Machine, and especially to the floating table. The first improvement consists in substituting a rolling for a sliding contact, by introducing bodies of spherical form between the moveable and the supporting surfaces. 2. To the construction of the tool carriages, the object being to enable tools to be applied simultaneously to the

surface to be engraved in certain positions relatively to one another.

FONTAINEMOREAU, P. A. L. DE. *Improved apparatus for preparing carbonic acid gas, and impregnating liquids therewith.* Dated Nov. 20, 1856. (No. 2745.)

This invention cannot be described without engravings.

JOYCE, T. F. *Improvements in joining, supporting, and strengthening the rails of railways.* Dated Nov. 20, 1856. (No. 2748.)

This consists in joining and strengthening rails, by plates fitting or passing round the lower part, and lying against the sides of the rail, and fixed on the rail by being rivetted or bolted thereto.

MORGAN, W. *An improvement in heating parts of cylinders and other hollow bodies of iron to a welding heat.* Dated Nov. 20, 1856. (No. 2749.)

This consists in employing flames of gas interior and exterior of such bodies.

BENSON, R. B. *Improvements in reefing sails.* Dated Nov. 20, 1856. (No. 2750.)

This consists in fitting across the sails as many foot ropes as there are required to be reefs, and in securing thimbles or eyes at intervals across the sail. To the bottom of the sail are attached buntlines, which are carried through the thimbles up through blocks or sheaves, one on each side of the mast. These buntlines are secured to one rope on each side of the mast, and carried down to the deck. Each end of each foot rope has a reef sheet carried through a block on the end of the yard, just below it, and these sheets are also carried down to the deck. The plan is modified for the lower square sails.

BROOMAN, R. A. *A method of, and certain varnishes or compositions for, rendering wood and other substances uninflammable and fire-proof; applicable also to the indurating of calcareous earths and stones, and to the rendering of paper and fabrics damp-proof, together with apparatuses for manufacturing such compositions.* (A communication.) Dated Nov. 20, 1856. (No. 2751.)

This consists in employing certain vitreous compositions for the above purposes.

EATON, R. *Improvements in apparatus for buffing on railways, and for other purposes.* Dated Nov. 20, 1856. (No. 2752.)

These consist—1. Of apparatus for preventing the injurious recoil of buffers. 2. In the arrangement of small or short spiral and volute springs. 3. In the modes of forming springs of thin vulcanised india-rubber, or gutta percha, &c. This cannot be described in full without engravings.

DARTOIS, L. *An improved machine for the cleansing of textile and fibrous substances.* Dated Nov. 21, 1856. (No. 2753.)

This invention cannot be described without engravings.

CLARE, J. W. *Improvements in preventing, removing, consuming, and condensing smoke and noxious vapours, and in apparatus for those purposes.* Dated Nov. 21, 1856. (No. 2757.)

A pair of pumps placed vertically, and working alternately, is applied for drawing the air and smoke from furnaces. The valves of the pump are so arranged that the soot which may condense upon them is shaken off by their own action.

TOOTH, C. *Improvements in charging or filling and filling up casks or other vessels for containing fermenting liquors.* Dated Nov. 21, 1856. (No. 2758.)

Instead of placing the main filling pipe on the top of the casks, the patentee places it so that the branches therefrom enter direct from the charging main into the heads of the casks (which are suspended horizontally in a frame), so that the filling, &c., is effected by one and the same pipe, whilst another pipe receives the yeast as it escapes from the casks.

LUDEWIG, F. *An improved leaven.* Dated Nov. 21, 1856. (No. 2759.)

The composition of the improved leaven is as follows;—1. Flour of germinated barley, 66 lbs.; flour of germinated white beans, 66 lbs.; potato starch, 66 lbs. 2. Sweet leaven produced from a preceding operation, 50 lbs. 3. Gelatine, 6 lbs. 4. Of exhausted wort resulting from a brewing operation, a sufficient number of pints. 5. Sweet leaven, produced from a preceding operation, 8 lbs. 6. Carbonate of ammonia, 2 ozs.

NEWTON, W. E. *Improvements in machinery for spinning or twisting fibrous substances.* (A communication.) Dated Nov. 21, 1856. (No. 2761.)

This consists in the application to all kinds of spinning machinery of what the inventor calls a "whistle," which is similar to the tube employed in machinery for spinning cotton. Here the tube is mounted between the drawing rollers and front roller, so that it can neither rise nor fall. This "whistle" or tube serves to prevent the fibres of the yarn from rolling around the drawing roller or its pressing roller.

JACOBS, W. *An improved composition for bedding and rendering bricks in furnaces.* Dated Nov. 21, 1856. (No. 2762.)

This consists of one yard of black foot loam, three yards of pulverised chalk flints, and one yard of hydraulic or stone lime which has been previously slacked by exposure in the air.

BARRANS, J. *Improvements in apparatus for applying oil or lubricating fluid to the axles of railway carriages and locomotive engines.* Dated Nov. 21, 1856. (No. 2763.)

An oil box is formed in or applied to an

axletree box in which one or more rotating surfaces are used. It is preferred to have cylinders on a suitable axis, which by their revolution bring up the oil to the under surface of the axle. The lubricating cylinders pass through openings in a cover to the box containing the oil, such cover resting on the surface of the lubricating cylinders acts as a doctor or scraper.

RUSSELL, S. *Improvements in the construction of scissors and shears.* Dated Nov. 21, 1856. (No. 2764.)

This consists in the use of a spring to compensate for the wear, by drawing up the rivet or pin, and thus keeping the blades in contact. A curved steel spring is preferred. This spring has a hole at or near its centre, through which the rivet or pin passes. The spring is placed on the outer side of one of the blades, and its ends press on the surface thereof.

BROOMAN, R. A. *A method of, and preparation for rendering textile and other like fabrics sanitary and disinfecting agents.* (A communication.) Dated Nov. 21, 1856. (No. 2765.)

This consists in impregnating cloth, &c. (by immersion or sprinkling), with a preparation consisting of equal parts of a solution of nitrate of lead at or about 25°, and a solution of nitrate of lime at or about 20°.

GARTON, C., and J. St. J. G. PARSONS. *A method of treating cane sugar in order to fit it to be employed in brewing and distilling.* Dated Nov. 21, 1856. (No. 2766.)

In carrying out this invention mix water with the sugar, add acid thereto, and expose the solution for about five days to a temperature of about 150° Fahr.; then neutralise the acid by chalk or other agent. The sulphate of lime is separated from the solution by allowing it to precipitate, or by filtration, when it will be ready for use.

ROBERTS, T., J. DALE, and J. D. PRITCHARD. *Improvements in obtaining and purifying oxalate of soda, which improvements are also applicable to the manufacture of oxalic acid.* Dated Nov. 21, 1856. (No. 2767.)

This consists in submitting woody fibre or other organic substances to the combined action of caustic soda and caustic potash at a temperature of 350° to 400° Fahr.; whereby oxalate of soda is obtained, mixed with carbonates of soda and potash, as also with a small quantity of these alkalies in the caustic state.

CLARK, A. *Improvements in the application and construction of revolving window shutters and blinds and metal window sashes.* Dated Nov. 21, 1856. (No. 2768.)

This relates to window shutters and blinds composed of a series of laths hinged together so as to roll up and unroll, and consists in applying strips of steel as springs across the laths, so as to give them a tendency to coil themselves up, which springs may either be sufficiently strong to coil up the shutters altogether, or only to assist that operation, and may or may not form the connection between the laths. Springs of india rubber may be similarly applied. Further improvements are also included. The improvements in metal window sashes consist in applying a thin covering of brass, or other metal, on a body of iron plate.

HENLEY, W. T. *Improvements in electric telegraphs, and apparatus connected therewith.* Dated Nov. 22, 1856. (No. 2769.)

Claims.—1. The magneto-electro arrangement described by which the poles of the soft iron in the coils of wire are reversed without motion in themselves. 2. The method of constructing recording telegraphs in which the signals are marked on slate or glass, so that they can be rubbed off, and the material used again for any length of time, and for the method of marking on the prepared paper, and giving the paper a suitable surface. 3. The method of constructing submarine or subterranean telegraph ropes by the use of a combination of wire and tape and tarred yarn in the manner described.

TERRY, A. R. *Improvements in sawing, splitting, cutting, and binding kindling wood.* Dated Nov. 22, 1856. (No. 2771.)

This invention cannot be described without engravings.

TUCKER, E. *Improvements in preparing and drying glue and gelatinous matter.* Dated Nov. 22, 1856. (No. 2773.)

This relates principally to the drying or desiccation of ordinary glue, but applies also to the drying of gelatinous matter of other kinds. Instead of running the boiled glue into wooden troughs, and drying it in thin layers, the inventor pours it into separate pans, which are disposed on racks in a drying chamber. The liquid glue is then subjected to the action of a strong heat from 140° to 160° of Fahr. scale. Whilst this heating operation proceeds, ventilation is carried on through the chamber by fans.

WHEELER, J. *A method of converting rotary into reciprocating motion, especially applicable to machinery for forcing plastic substances through moulds and dies.* Dated Nov. 22, 1856. (No. 2774.)

This invention is described and illustrated at page 104 of this number.

BROOMAN, R. A. *Improvements in the manufacture of artificial wines, or beverages to be substituted for wines, and in apparatus for aiding fermentation.* (A communication.) Dated Nov. 22, 1856. (No. 2775.)

This consists in mixing with water as a basis, sugar, cream of tartar, tartaric acid,

and yeast with iris, coriander, elder, or cloves, and a vegetable colouring matter; and in raising the mixture to such a temperature as will keep it at a state of vinous fermentation, and when the fermentation is about to cease allowing the temperature to fall gradually; also in an apparatus for aiding or inducing fermentation in fermentable liquors.

WRIGHT, J. S. *Improvements in the manufacture of paper or papier mâché and metal buttons.* Dated Nov. 22, 1856. (No. 2776.)

In making papier mâché buttons, grooves are cut therein, which are filled with cements of various colours, the filling being in excess, so as to admit of its being ground and polished down to the general surface of the button.

LAYCOCK, W. E. *Improvements in looms for weaving.* Dated Nov. 22, 1856. (No. 2777.)

This relates to looms for weaving horsehair seating and crinoline, and will facilitate the working by power. The 1st point refers to the jacquard apparatus, and consists in enabling the attendant to effect a backward or forward motion thereof at pleasure; also in constructing the jacquard cylinder so as to dispense with the cards. 2. It refers to the pricking motion. 3. To a method of adapting the lathe. 4. To the stopping and starting of the loom. These several improvements cannot be described without engravings.

NEWTON, W. E. *Certain improvements in railway carriages.* (A communication.) Dated Nov. 22, 1856. (No. 2779.)

Claims.—1. The construction of the bodies of railway carriages with the sides of wrought iron lattice, combined with the floor frame and uprights. 2. The employment in the construction of the sides of railway carriages of wrought iron lattice work covered on its interior or exterior, first with felt, &c., and then with oil-cloth, or other waterproof material. 3. The combination with a lattice work floor of a receptacle below the floor to collect the dirt. 4. The mode of constructing, applying, &c., the moveable flanged guide wheels, to allow the carriage to run on or off the rails at the pleasure of the person in charge.

SALT, G. *Improvements in weaving carpets and other piled fabrics.* Dated Nov. 24, 1856. (No. 2781.)

In a patent granted to F. W. Mowbray, 21st of May, 1855, it is proposed to weave carpets by the use of longitudinal pile wires or instruments of a peculiar character. And this invention relates to improved means for effecting the crossing of the pile threads to form the pile loops over such description of pile wires when the pile threads are operated by jacquard or other harness. The patentee employs a bar of points between which the threads to form pile are raised, and by which they are conducted to the desired side of the pile wires.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

GRIEVE, J. *Improvements in chimney cans.* Dated Nov. 18, 1856. (No. 2725.)

This cannot be described without engravings.

GILMAN, T. *Improvements in boxes or packing cases.* Dated Nov. 19, 1856. (No. 2728.)

These consist in so arranging the parts of boxes or packing cases, that, when not in use, they may be folded on to each other and occupy considerably less bulk than when open.

DISTIN, H. J. *Improvements in cornets and other wind musical instruments.* (A communication.) Dated Nov. 19, 1856. (No. 2729.)

This invention cannot be described without engravings.

CHURCHILL, W. S., and J. BRADSHAW. *Improvements in machinery or apparatus for drying yarns or fabrics, applicable to machines for sizeing or dressing yarns or threads to prepare them to be woven.* Dated Nov. 19, 1856. (No. 2730.)

This consists in employing a series of pipes arranged in a circle to form a skeleton cylinder, or the segment of a cylinder. This skeleton cylinder is surrounded by a skeleton cylindrical frame or cage, which is placed so as to rotate round the pipes which are fixed. The yarn, &c., passes over, and rests upon this frame or cage, which is carried round by it as it passes through the machine, being employed to bring the yarns, &c., as near the drying steam cylinders or pipes as possible, without touching and without friction upon them. They combine a fan placed outside or axially within the skeleton cylinder of pipes to produce a current of air upon the passing material.

JONES, J. and E. *Improvements in the manufacture or production and treatment of metal castings.* Dated Nov. 19, 1856. (No. 2731.)

This relates to the manufacture of cast metal pipes, &c., having some reference to the moulding apparatus patented 9th May, 1853, by D. Law and J. Inglis. In this invention the rammer spindle is held and worked by a cylindrical gripping box, turning with the rammer spindle in a cylindrical socket upon the reciprocating slide which gives the descending and ascending movement to the rammer spindle. The gripping box is fitted with a number of

wedges placed equidistantly round the spindle, which are pressed into the box so as to grip the spindle by a ring acted upon by a spring and forked lever.

CAITHNESS, Earl of. *Improvements in driving belts, straps, or bands for machinery, and in the application and use thereof.* Dated Nov. 19, 1856. (No. 2733.)

This relates to the use of sheet metal, such as iron, steel, brass, &c., for driving belts or bands for all classes of machinery.

YEARSLEY, J. *An improved method of and instrument for applying artificial tympanums.* Dated Nov. 19, 1856. (No. 2737.)

This consists in passing into the ear a piece of cotton wool, wetted in tepid water, by means of a tube and a piece of thread attached to the cotton wool.

SALT, E. *An improved paper cutting machine.* Dated Nov. 20, 1856. (No. 2742.)

This machine has a roller worked by a crank attached at one end to a chain working into a toothed wheel or on a pulley, and is weighted at its other end. The inventor provides levers, studs, and double-faced cams at each side, and inside of the machine framing which measures the length of the paper sheet at each interval of cutting. The same motion also works the drop board or gripper. The knife slides in brackets, with an oblique motion attached, and is worked by a double-faced cam, in which a roller works on a shed-pin, fixed to the connecting rod.

IRLAM, W., and J. PHILLIPS. *Improvements in working railway signals or alarums.* Dated Nov. 20, 1856. (No. 2744.)

This consists in so giving signals on railways, that an advancing train is made to give notice to a following train when it has progressed a certain distance. A lever is jointed to the rail, and depressed by the wheels of the locomotive engine or carriage. This lever gives motion to a shaft, connected to a similar lever at the required distance, and to a rod supported by a signal post, furnished with a lamp, semaphore, bell, &c. Counter weights are dispensed with.

FONROBERT, C. F. J. *Improvements in the manufacture of boots and shoes.* (Partly a communication.) Dated Nov. 20, 1856. (No. 2746.)

This consists in covering the soles of boots, &c., with a composition of gutta percha and tar.

FONROBERT, C. F. J. *Improvements in the manufacture of insulated wires for electric telegraphs.* (Partly a communication.) Dated Nov. 20, 1856. (No. 2747.)

This consists in insulating wires for electric telegraphs by covering them with a composition of gutta percha and tar.

BERGEVIN, A. M. M. DE. *A method or methods of purifying coal without decarbonization.* Dated Nov. 21, 1856. (No. 2754.)

The object here is effected by placing the coal in a bath of one of the following compositions:—No. 1, sulphuret of calcium, anhydrate chloride, or other forms of lime; petroleum or coal tar; sulphate of iron; nitrate of potassa or other salts; and sulphuric acid dissolved or held in water. No. 2, the same ingredients as No. 1, with bicarbonate of soda added. No. 3, the same as Nos. 1 and 2, with the addition of asbestos. No. 4, the same as Nos. 1, 2, and 3, with sulphate of lime and muriate of magnesia, and the double salts of manganese and lime.

NORMAN, J. *Improvements in propelling navigable vessels.* Dated Nov. 21, 1856. (No. 2755.)

This is chiefly applicable to that class of vessels in which auxiliary propellers are used, and consists in mounting flat submerged propeller blades upon the driving shaft, in such a way that when out of use they will fall fore and aft.

LIEBMANN, C. H. J. W. M. *Improvements in the purification of water, and in the preparation of materials employed therein.* (A communication.) Dated Nov. 21, 1856. (No. 2756.)

The material employed is carbonic acid, prepared in considerable quantities out of pure and impure carbonate of lime by burning the same in retorts, &c., in which the same stock of carbonate of lime or of the precipitate produced in the process of purifying water may be renovated by washing, and employed over and over again in and for the purification of water.

ROTHENHEIM, S. *An improved walking-stick pipe.* Dated Nov. 21, 1856. (No. 2760.)

Walking sticks are bored out, and then converted into tubes or stems for tobacco-pipes. The mouth-piece is fitted to the thin end of the stick, and the ferrule is made to screw on and off, so as to protect the mouth-piece. The knob or handle is hollowed out to form the bowl, and lined with metal or pipeclay. The cap of the bowl is made in the form of a lid.

GALLOWAY, G. B. *Improvements in furnaces for steam boilers and other uses.* Dated Nov. 22, 1856. (No. 2770.)

There is an additional fire-place, in which it is intended to consume coke, and over the fire the flames from the other fires are caused to pass by means of flues or tubes. An air channel extends across the front of the several fire-places. Into this channel air is supplied, and there are apertures therein with short pipes, communicating with the fire door frames, and also the fire bars, which are hollow, and furnished with

apertures through which the air can escape in a lateral direction to or by means of apertures through the bridges. The air, on being admitted into the said channel, will pass into the hollow fire bars, and out of them into the spaces between the bars.

HALL, W. K. *Improvements in machinery for cutting, punching, and shaping metals.* Dated Nov. 22, 1856. (No. 2772.)

This consists in cutting from the bar only the quantity of metal necessary to form the nut, and compressing it into shape by means of dies or a variable matrix in addition to the ordinary punches.

CHADWICK, D., and H. FROST. *Improvements in apparatus for measuring water and other fluids, and gas.* Dated Nov. 22, 1856. (No. 2778.)

This consists in the employment of a flexible cylinder divided into two chambers by a disc or piston, each of which is in its turn open to the supply, so as to force forward the partition and expel the fluid from the other, which then becomes filled to act in like manner, so as to effect a discharge, and this is regulated by means of an arrangement similar to a four-way cock. Also in the employment of metal or other rigid cylinders divided by pistons into chambers, and mounted so as to be capable of oscillating upon centres. And in the use of cylinders formed upon the telescope principle, chambers for measuring by their expansion and contraction; these may be employed in combination with the oscillating motion above described, or they may have a parallel motion only.

HUNT, E. *Improvements in looms for weaving ornamental fabrics.* Dated Nov. 24, 1856. (No. 2780.)

The object here is to arrange the shuttle box movement of many shuttled looms, so that the shift required between one shuttle's entrance into the shuttle box and the succeeding shuttle's exit is never greater than that which takes place in a two shuttle loom. The invention consists essentially in making a preparatory shift of the shuttles, or in bringing whatever shuttle is about to be wanted close to the cell of the last shuttle before this actually enters its cell.

MARTIN, J. K. *Improvements in hoisting or purchase-apparatus for ships and vessels.* Dated Nov. 24, 1856. (No. 2783.)

In one modification the main vertical spindle of the capstan has upon it a double crank, and a connecting rod from each passes to the paul apparatus of the windlass, so that, as the capstan spindle revolves, a continuous movement is imparted to the windlass barrel.

COOKE, M. J. *Certain improvements in washing, wringing, and mangling machines.* Dated Nov. 24, 1856. (No. 2784.)

Washing has heretofore been done with balls, but it was necessary for such balls to float in water or suds, in order that the machine should work. Here it is not necessary for the balls to float. Balls having a specific gravity greater than water, wash equally well, but some of each may be used. A box nearly round, with a top in the shape of a hopper, is fixed upon two rockers. A plug hole is made in the end of the box to discharge the soap suds. The box is provided with handles whereby the rocking motion is imparted, which affects the washing. Wringing and mangling rollers may be attached.

ASTON, W. H., and S. HOPKINSON. *Improvements in steam boiler furnaces, and apparatus employed for supplying water to steam boilers.* Dated Nov. 24, 1856. (No. 2786.)

Here the furnace is arranged with two sets of hollow fire bars. The upper set has in front a set of ordinary bars, so arranged that the fuel thereon is supplied with air up through the ordinary front set of bars, and the products pass from the fuel on such set of bars over and down through the fuel on the upper set of hollow bars. There is a water bridge or box at the back end of the upper set of hollow bars, through which there is an opening below the upper set of hollow bars: at a point below the opening through the water bridge, and below the upper set of hollow bars, is a second or lower set of hollow bars, on which there is a second fire over which the products from the upper fire pass. Air may be admitted above and below such second fire. Beyond the water bridge above mentioned is a second water bridge at the lower part of the flue over which the products from the fires pass.

PROVISIONAL PROTECTIONS.

Dated May 20, 1857.

1418. Thomas Knight, of Upton, Chester, wheelwright. An improved cutter and cultivator of land.

Dated May 25, 1857.

1467. Henry William Ford, of Gloucester, civil engineer. Improvements in apparatus for facilitating the draft and locomotion of carriages.

Dated June 1, 1857.

1544. Henry Davis Pochin and James Woolley, of Manchester, manufacturing chemists. Improvements in the manufacture of gum from amylaceous substances.

Dated June 6, 1857.

1600. Henry Clarke, of Horncastle, Lincoln, clerk. Improvements in rotary engines.

Dated June 12, 1857.

1644. John Elce, of Manchester, machinist, and Samuel Hartley, of the same place, brass moulder. Improvements in machinery for preparing moulds for casting iron or other metals.

Dated June 16, 1857.

1680. James Cocker, of Liverpool, wire drawer. An improved construction of gauge for measuring wire and other articles.

Dated June 20, 1857.

1734. Lambert Cowell, of the Adelphi, gentleman. An improved machine for teaching the art of swimming.

Dated June 24, 1857.

1759. Richard Morcom, of Redruth, Cornwall, mining agent. Improvements in dressing ores.

Dated June 25, 1857.

1776. Charles Grafton Page, of Washington, U. S. A. Improvements in cylindrical door bolts.

1778. Ernest Auguste Bourry, of St. Gall, Switzerland, engineer. Improvements in kilns or ovens for burning or baking bricks, tiles, and other earthen or ceramic matters.

1780. John Loach, japanner, of Birmingham. A metallic air-tight coffin.

1782. Elijah James Crocker, of Liverpool, ship chandler. Improvements in the rigging of ships and other vessels. A communication.

1786. Jacob Green, of Onehouse, Stowmarket, Suffolk. Certain improvements applicable to bedsteads and other articles of furniture, for the purpose of excluding therefrom bugs or other similar insects.

1788. James Lamb Hancock, of Pentonville, manufacturer. Improvements in means or apparatus for washing or cleansing.

1790. William Bough, of Bunhill-row, London. Improvements in lamps for burning resin and other oils and fluids, also an improvement in Argand gas burners.

1791. Stephen Bourne, of Leonard's-square, Kentish Town. An improvement in the manufacture of felted fabrics.

1792. Howard Glover, of Lambeth, millwright. An improvement in pump buckets.

Dated June 26, 1857.

1794. Robert Hattersley, of Ardwick, near Manchester, engineer. Improvements in machinery for distributing and setting up or composing type.

1796. William Parsons, of Brighton, carpenter. Improvements in fittings to door handles and spindles.

1798. William Crook, Gilbert Rushton, and Joseph Crowther, all of Blackburn. Improvements in looms.

1800. Michael Michaelis, of Manchester, warehouseman, and John Clemson, of the same place, dyer and printer. Improvements in the production of ornamental textile fabrics by printing.

1802. Stanislas Gaudrion, of Chancery-lane. An improvement in screw propellers. A communication from J. Vergne.

Dated June 27, 1857.

1804. Joseph Pollard, of Highdown, near Hitchin, farmer. Improvements in machinery or apparatus for distributing manure.

1806. John Green, of Newcastle-upon-Tyne, architect, and William Coppin, jun., of Blyth, Northumberland, agent. The preservation of timber.

1808. Pierre Eugène Liger, of Rouez, France, miller. Improvements in grinding mills.

1810. George Swindells, of Bollington, Chester, cotton spinner, and Jonathan Arnold, of the same place, manager. Certain improvements in spinning and doubling yarns, and in machinery or apparatus of the kind commonly known as mules and twining jennies.

1812. William Edward Newton, of Chancery-lane. Improved machinery for grinding the teeth of card cylinders. A communication.

Dated June 29, 1857.

1814. Narcisse Laurent, of Paris, merchant. Improvements in the process of dressing and manufacturing shammy leather.

1818. James Lawrence, of Colnbrook, Middlesex, brewer. Improvements in apparatus for brewing.

1820. Henry Gilbee, of South-street, Finsbury. Improvements in machinery for moulding vermicelli and other paste. A communication.

1822. Gustav Adolph Buchholz, of Strasbourg, France, civil engineer. Improved machinery for hulling and cleaning rice, wheat, and other grain.

Dated June 30, 1857.

1826. Isidore Charles Clöet, of Ghent, Belgium, engineer. An improved rice and barley mill.

1830. William Pole, of Birdcage-walk. Improved means for supporting telegraph wires. A communication from C. C. Adley, of Serampore.

Dated July 1, 1857.

1832. Thomas Brewer, of Neithrop Banbury, Oxford, whitesmith. Improvements in machines for cutting and reducing turnips or other vegetable substances.

1834. Carl Johann Lawrence Leffler, of Westbourne-terrace, gentleman. Improved machinery for cutting corks, bungs, and other similar articles. A communication.

Dated July 2, 1857.

1838. Andrew Smith, of Princes-street, engineer. Improvements in the construction of life boats and other boats or vessels.

1840. Augustus Philibert Malard, of Paris, engraver. Certain improvements in filtering water and other liquids.

1842. Thomas Moy, of Clifford's Inn, law stationer. Improvements in the mode of working steam engines.

1844. Edward Taylor Bellhouse and William John Dorning, of Manchester, engineers. Improvements in steam boilers.

1846. George Davies, of Serle-street, Lincoln's-inn. An improved marine steam engine governor. A communication from W. H. Elliot, of Plattsburg, U. S. A.

1848. Tomyns Browne, of Liverpool. An instrument for ascertaining the true or actual acclivity and declivity of bodies.

1850. William Rowan, of Belfast, engineer and boiler maker. Improvements in steam boilers and furnace flues.

Dated July 7, 1857.

1875. John Alison, of Hainault Forest, Essex, gentleman. Improvements in preparing vegetable substances for feeding animals, and in apparatus for that purpose.

1877. Wilhelm Adolf von Canig, of Leipsic, gentleman. A new or improved compound or composition to be used as a substitute for gum, paste, and other adhesive materials, and for finishing, sizing, or stiffening fabrics and other articles to which the same is or may be applicable.

1879. Joseph Platt, of Audlem, Chester, gentleman. Improvements in gun locks.

1881. John Speight, of Bradford, York, wool comber. Improvements in wool combing and in machines known as "Colliers" combing machines.

1883. Peter Hippolyte Gustave Bérard, of Paris. Improvements in manufacturing azotic cotton or pyroxile for photographic and other purposes.

1885. John Louis Jullion, of Foot's Cray, Kent, analytical chemist. The mechanical and chemical separation of solids from fluids.

1887. Richard Archibald Brooman, of 166, Fleet-street, London, E. C., Editor of the *Mechanics' Magazine*, and patent agent. The manufacture

upon circular frames of a fabric suitable for petticoats and other garments, curtains, and other articles of furniture. A communication from M. Lucevilliard.

1889. William Burgess, of Newgate-street, agricultural implement maker. Improvements in reaping and mowing machines.

1891. Michael Henry, of Fleet-street. Improvements in railways and wagons used therewith, in loading and discharging coals, stones, ballast, earth, and other materials. A communication from B. A. Soullie and G. Vigneau.

Dated July 8, 1857.

1893. John Talbot Pitman, of Gracechurch-street. A conical tent. A communication.

1895. Thomas Frederick Henley, of Bromley, Middlesex. Improvements in the preparation or manufacture of certain beverages or liquors of the nature and character of home-made wines, and in the means of obtaining the same.

1897. Joseph Gibbs, of Abingdon-street, Westminster, civil engineer. Improvements in extracting gold and silver from their matrices, and from other substances or materials with which they are combined, mixed, or associated.

1899. Edward Taylor Bellhouse and William John Dorning, of Manchester, engineers. Certain improvements in hydraulic presses.

1901. Louis Albert Bahn, of Greek-street, Soho, gentleman. Improvements in galvanizing metals, and in the apparatus employed therein.

1903. Robert Moore, of Isleworth, Middlesex, naval architect. Improvements applicable to navigable vessels and the propelling thereof.

Dated July 9, 1857.

1905. Charles Patrick Stewart, of Manchester, engineer, and David Graham Hope, of the same place, civil engineer. Improvements in the valve gear of locomotive and other engines.

1907. John Dunsmore MacNicol, of Manchester, designer. Improvements in machinery or apparatus for cylinder printing.

1909. John Scott Russell, of Millwall, engineer. Improvements in apparatus and slips for moving ships and vessels out of and into the water.

1911. Cosmo Logie, of the Royal Horse Guards, surgeon. An improvement in, or addition to, firearms.

1913. Florentin Delmas, of Paris, civil engineer. Improvements in ventilating ships, mines, and other places.

1915. William Johnson, of Lincoln's-inn-fields. Improvements in capstans. A communication.

Dated July 10, 1857.

1917. Charles De Bergue, of Dowgate-hill, engineer. An improvement or improvements in the manufacture of apparatus for condensing and cooling purposes.

1919. Isac Louis Pulvermacher, of Paris, engineer. Improvements in pipes and tubes for smoking.

1921. Sir Francis Charles Knowles, of Lovell-hill, Berks, baronet. Improvements in the manufacture of iron.

1923. John Gill, of Newtyle, Forfar, N. B., draper. Improvements in reaping machines.

1925. James Moon, of Malton, York, Robert Belt and George Ewbank, both of Lutton, York. An improved agricultural implement.

1927. Webster Woodman, of Paris, gentleman. Improvements in railroad wheels. A communication from J. W. Aldin, of New York.

1929. Richard Hornsby, jun., of Spittlegate, near Grantham. Improvements in apparatus for hummelling, removing the husk from, and cleansing grain.

Dated July 11, 1857.

1931. Edouard Primard, of Paris, civil engineer. Improvements in treating auriferous, argentiferous, or other metallic ores.

1933. Datus Ensign Rugg, of New York. An improvement in water guages for steam boilers.

1935. Francois Burot, merchant, of Paris. A new process for gilding and plating over silk, cotton, wool, and all other textile and fibrous matters.

1939. Alexandre Amand Noël Dépinhay-Prèhamon, of Paris, notary. Improvements in windmills.

Dated July 13, 1857.

1941. Henry Starr, of Liverpool, merchant. Improvements in hinges. A communication.

1943. Nicholas and Thomas Williams, smiths and ironfounders, of Helston, Cornwall. Improvements in the form and arrangement of the driving gear of thrashing machines, and in the form and mode of applying the straw shakers to such said machines.

1945. James Heywood Whitehead, of Saddleworth, York, esquire. Improvements in milling endless cloths.

1947. William Edward Newton, of Chancery-lane. Improvements in the manufacture or reduction of platinum. A communication from J. H. Debray, of Paris.

1949. William Edward Newton, of Chancery-lane. An improved mode of preventing incrustations in steam boilers. A communication.

Dated July 14, 1857.

1951. Barnabas Urry, of Newport, Isle of Wight, engineer. Improvements in seed-drills.

1953. Frederick Crace Calvert, of Manchester, professor of chemistry, and Charles Lowe, of Halifax, York, analytical chemist. Improvements in the manufacture of size.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," July* 28*th*, 1857.)

727. J. Wheatman and J. Smith. Improvements in the mode of grinding circular saws.

740. J. Moes. Improvements in warming and ventilating.

768. J. Lewis. Improvements in machinery or apparatus for reaping and mowing.

779. H. Hall. An addition to throstles for doffing the bobbins.

782. C. Weiss, H. Lister, and J. Mitchell. Improvements in finishing woollen and other textile fabrics, and in the machinery or apparatus employed for that purpose.

786. J. Chedgey. Improvements in machinery for mangling, calendering, or pressing goods.

788. I. Atkin and M. Miller. Improvements in dividing lace.

804. B. Blackburn. Improvements in the manufacture of pens.

805. T. H. Head and J. Wright. Improvements in casting railway chairs and in the manufacture of other castings.

816. J. J. Baranowski. An improved method of, and apparatuses for, signalling upon railways.

819. R. H. Collyer. Improved machine for cleaning and purifying wheat and other grain.

824. S. Fox. Improvements in hardening and tempering steel wire, and in straightening wire.

829. J. Mickle. Improvements in machinery or apparatus for reaping and mowing.

842. J. Radcliffe, J. Farnehough, and J. Mather. Certain improvements in index machines applicable to looms for weaving.

848. J. J. C. Benoist. A new method of applying marks on paper for postal purposes.

849. A. F. Butler. Improvements in machinery for pulping coffee.

850. J. L. Clark. Improvements in lighting coal mines.

857. E. Hochstetter. The employment for motive purposes of sulphuret of carbon, an agent not hitherto so used. Partly a communication.

886. G. Hamilton. Improvements in the treatment or finishing of woven fabrics.

9‹2. W. Smith. Improvements in the manufacture or production of ornamental fabrics.

907. A. V. Newton. Certain improvements in fire-arms. A communication.

921. A. V. Newton. Improvements in repeating fire-arms. A communication.

933. F. M. Baudouin. Improvements in the wires or conductors of electric telegraphs, and in the machinery for the manufacture thereof.

934. J. H. Johnson. Improvements in the treatment of floss silk. A communication.

943. A. Leclercq. Certain improvements in sleepers of railways.

950. J. H. Johnson. Improvements in steam hammers. A communication.

979. W. S. Gale. Improved means for rendering the joints of engines or other machinery steam or fluid tight.

994. A. V. Newton. An improvement in hand bullet moulds. A communication.

1007. W. Clark. An improved instrument for indicating the pressure of steam. A communication.

1033. J. B. Pascal. Improvements in electric lamps.

1099. H. D. Deane. Improvements in the floats or paddle boards of paddle wheels.

1172. W. E. Newton. The application of certain substances not hitherto used for food as a source of nutrition and support to the respiratory organs of animals. A communication.

1243. A. L. Cauville. Improvements in the manufacture of shoes and boots.

1250. J. Fox. Improvements in the music scale and musical instruments.

1373. F. Whitaker. Improvements in the construction of machinery for sewing and embroidering.

1389. J. Ellis. Improvements in the manufacture of artificial stone.

1680. J. Cocker. An improved construction of gauge for measuring wire and other articles.

1796. W. Parsons. Improvements in fittings to door handles and spindles.

1806. J. Green and W. Coppin, jun. The preservation of timber.

1881. J. Speight. Improvements in wool combing and in machines known as "Collier's" combing machines.

1921. Sir F. C. Knowles. Improvements in the manufacture of iron.

1922. J. Gill. Improvements in reaping machines.

1929. R. Hornsby, jun. Improvements in apparatus for hummelling, removing the husk from, and cleansing grain.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1604. John Knight and James Stubbs.
1616. William Septimus Losh.
1621. Richard Roberts.
1627. Francis Preston.
1630. Ephraim Hallum.
1633. Thomas Bell and Henry Scholefield.
1643. Louis Christian Koeffler.
1650. Auguste Edouard Loradoux Bellford.
1661. Alexander Law.
1667. Amable Hippolite Petit.
1782. Thomas Waterhouse.

LIST OF SEALED PATENTS.

Sealed July 21, 1857.

1037. Joseph and Edmund Ratcliff.
1177. Joseph Belshaw.
1247. John Peter Booth.
1295. John Stenhouse.
1345. Stephen Yeldham.
1407. William Whitehead.
1413. John Hardley.

Sealed July 24, 1857.

218. Charles James Wiggs.
238. William Allen Turner.
258. George Edward Dering.
260. Charles Edward Symonds.
263. George Sampson, Joseph Sampson, and Elijah Ledger.
288. Duncan Morrison.
296. William Dray.
301. Jean François Dudebout.
324. Charles de Bergue.
331. Philipp Schäfer and Frederick Schäfer.
354. Joseph Nicolas Victor Cadiat.
376. Henry Willis.
387. August Frederick William Partz.
422. Charles Crossley, Dan Leeming, and John Crossley.
437. Andrew Barclay Walker.
448. William Edward Newton.
536. Claude François Latruffe.
583. William Edward Newton.
632. Thomas Brown.
687. William Edward Newton.
839. Charles Cowper.
846. George White.
879. John Henry Johnson.
894. Robert Alfred Wright and Louis Jules Fouché.
1008. Robert Turnbull.
1192. Wilson Ager.
1224. George Tomlinson Bousfield.
1393. Richard Bradley and William Craven.

Sealed July 28, 1857.

265. Charles de Bussy.
267. William Weild.
270. John Talbot Pitman.
277. Frederick William Campin.
282. Henry Smith.
283. Thomas Affleck.
284. James Owen.
298. Cotton Symonds.
305. Robert Morrison.
307. Thomas William Rayner.
308. James Hunt.
340. Richard Archibald Brooman.
358. Felix Lieven Bauwens.
359. Thomas Brown and George Parry.
360. Richard Archibald Brooman.
361. Richard Archibald Brooman.
372. David Falconer Wright.
395. Henry Heald and Arthur Heald.
410. Peter Hubert Desvignes.
432. George Hardstaff.
441. Josiah Firth and Joseph Crabtree.
489. William Clark.
508. John Whitehead.
553. Louis Emile Ossian Degrand.
598. James Murphy.
608. Charles Pauvert.
609. Charles Pauvert.
610. Charles Pauvert.
753. William Mac Naught.
1447. Frederick Walton and John Pinson.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

J. A. D.—It is now too late to criticise Mr. Harrington's theories in our pages. We thank you, however, for your letter. Your suggestion on guns has been made before.

480, *C.*—On looking further into the subject upon which you write, we find that we cannot suggest any method of getting the strips you require made; nor can we undertake, under the circumstances, to pronounce an opinion upon the merits of your invention. By doing so we should be likely to provoke useless controversy.

A Correspondent (who writes under different signatures without sending us his name) criticises our reply to "A Student," in our last number, in which the words, "the square of," were omitted by the printer from the top line of col. 2, p. 84. This correspondent would do well to become less dogmatic in the statement of his somewhat unique dynamical and statical principles. The first principles, and the reasoning upon which our own statements of last week rest, are so common and so widely known, that we thought it unnecessary to devote our space to a more minute examination of the question than was given. Our correspondent is, however, hardly justified in adopting the same brevity in laying down propositions of so novel and original a character as those which his letter contains. Before we can answer, or even understand his views, we must be made acquainted with the *facts* as well as the *theories* which he discusses, and with the reasoning which connects those facts and theories. To our remarks of last week we shall only add, that the measure of force is strictly independent of time, though this does not affect the question under notice, the whole of which may be dismissed as follows:—1st. The resistance to a plane moving perpendicular to itself through a fluid, according to the common law, meets with a resistance varying as Av^2, where A=area, v=velocity. And as this product in the given example is evidently constant, the resistance is constant. 2nd. It is an admitted principle that work in a given time is measured by the product of the resistance and the velocity at which that resistance is overcome, and therefore in the given example, since the resistance is constant, the work done in a given time varies as the velocity. To these remarks we have nothing to add, unless our correspondents take a little more pains to make their objections clearly understood.

CONTENTS OF THIS NUMBER.

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Mechanics' Magazine.

No. 1774.] SATURDAY, AUGUST 8, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street.

SISTERSON'S PATENT EXTENDING-JIB CRANES.

Fig. 2.

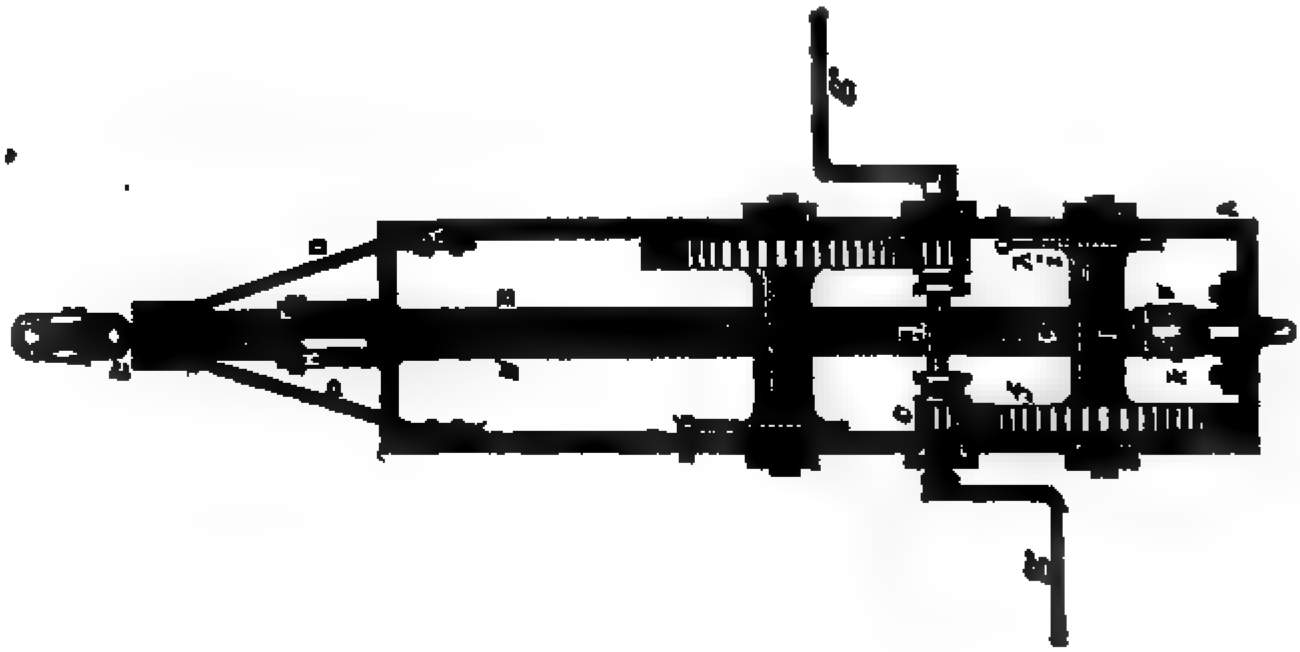

Fig. 1.

SISTERSON'S PATENT EXTENDING-JIB CRANES.

There are many positions in which the ordinary cranes used for loading and unloading merchandize are inapplicable, but in which a crane with an extending jib might be employed with much advantage. Mr. W. H. Sisterson, of Southwark, aware of this circumstance, has patented an improved form of crane in which the jib is formed in two parts connected in such manner that one part may slide along the other, and the jib thus be considerably lengthened. In confined places, such as narrow streets, the crane will occupy but little space until required for use, when the jib, being protruded, will stretch sufficiently far out to load and unload waggons, and perform the other duties required of a crane.

Fig. 1 of the engravings on the preceding page is a side elevation, and Fig. 2 a back view of a crane with one of the improved sliding elongating jibs. A A, is the frame of the crane. The stationary portion of the jib is composed of two plates, B B, and between these is fitted a central plate, C, free to slide up and down between the fixed plates. The stays or tension bars, D D, carry a sustaining friction roller, E, against which the sliding plate of the jib travels. A link or eye, F, is bolted to the lower end of the sliding plate to receive one end of a chain or rope, G, which is carried over a sheave, H, turning on an axis in bearings bolted on the fixed plates, B B, and on to the barrel of a windlass, I. In order to elongate the jib, the chain, G, is wound upon the barrel by throwing the pinion, *c*, on the shaft, *d*, into gear with the toothed wheel, *f*, and turning the crank handles, *g g*, the paul, *h*, enters the teeth of ratchet wheel, *i*, and keeps the jib in the position required. On releasing the paul and reversing the handles, the sliding portion of the jib will return to the position shown in the engravings, when the pinion, *c*, should be thrown out of gear with the toothed wheel *f*. *k k*, are sustaining guide rollers connected to the bottom of the sliding shaft. The remaining parts of the crane, used for raising and lowering merchandize, are constructed and fitted in the usual way.

A FEW FANATICS.

(*Contributed.*)

I am the editor of the *Meteor of Science*. As my office is situated near one of the principal thoroughfares of the metropolis, great facility is afforded to intruders, and much of my time has to be expended in discoursing with certain of these, and in pacifying myself after their interruptions. The annoyance I experience from them is immeasurably great. Almost daily they come in with their extravagances, their presumptions, their chimeras, and their obstinacies—a set of miserable missionaries, who everlastingly have some profound principle to reveal, or some astounding fact to publish, or some world-transforming scheme to develop. I propose to relieve my mind by making known a few of these fanatics.

The first that I shall mention was once rich, and while rich became possessed of, or rather by, a mechanical idea, which has cost him his fortune, which is costing him his health, and which will cost him his life. His idea is, that by certain arrangements of cords, pulleys, and a spring, he can increase a motive force, however small, to any extent, and that, too, without the least disadvantage in respect of time. Put into his apparatus one unit of work and you shall get from it fifty, five hundred, five thousand units! He has a model which proves his principle true. Suggest a doubt, and he straightway invites you over to a gloomy court, and up the stairs of a gloomier house, and into the chill air of a still gloomier chamber wherein are a chest, a mattress, and the model. You must excuse the meanness of the apartment, and the extreme rudeness of the apparatus you are to inspect, which is formed of a slip of thin board, the rib of an old umbrella, a bit of grimy string, a rusty nail or two, and three or four old blind pulleys. He once had one of polished rosewood, with a steel spring, brass studs and sheaves, and a silvered cord. But this has followed his fortunes, and gone from him. It does not matter; the principle is the same. He adjusts, as well as he is able, the miserable materials, and takes the grimy string in his withering fingers, and you at once behold the fallacy which is the curse and utter ruin of him. You behold it, and could point it out, and make it clear to every man who breathes, save one, and that one is the thin, hollow-eyed, short-breathed, consumptive fanatic from whom you turn, feeling within you solemn thanks that you studied your mechanics thoroughly at school and college.

This man's presence is an almost permanent plague to me. After for many years shifting the blame of the non-adoption of his invention from engineer to engineer, and from company to company, he has settled it finally upon me. It is because I

will send no gleam of it abroad in the *Meteor* that the idea is unknown, and the originator unrewarded. He has come at last to consider its publication as a debt I owe him, and he is a very pressing creditor indeed. Almost daily I hear his infirm feet creeping up the stairs, and his bony knuckles smiting the door, and then feel his bad breath gasped forth upon me, as he sits down at my side, and presses his melancholy claim. I am perfectly certain that, if I should ever come to possess such a fortune as he once had, I will never come to be what he now is.

There is not a more weak and wasteful visionary in the world than the old Earl of Mairsneste, who does me the honour of visiting me with very great frequency. He has been an inventor of machines for half a century, has spent at least fifty thousand pounds on patents, and only last week the *London Gazette* announced that provisional protection had been granted him by the Crown for an invention of "Improvements in propelling vessels by streams of fire."

There is something extremely singular in the composition of this noble friend of mine. He displays a most deadly dexterity in hitting upon what is useless and impracticable. He is perpetually obtaining the sole right to make, use, exercise, and vend an engine that never can be started, or a gun that will do nothing but burst, or a propeller which acts as an excellent anchor, or a life-buoy that cannot be made to float; and the right in each case costs him nearly fifty pounds sterling, and formerly cost him three times that amount.

Every Monday (while he is in town) brings him in upon me. He is fond of the *Meteor*. He has always been fond of meteors. Bright meteoric ideas—what but these, streaming in swift succession across the firmament of his mind, have made him the prodigal patentee that he is! He comes, and makes the day long with his wandering converse, in which he touches on every conceivable branch of practical science and art. My cunningest words never shake the faith he has in himself. How should they, when fifty years have rolled their adverse experiences against it in vain? I have not the least doubt that he will die obtaining provisional protection for a chimera. Though I do not desire the hastening of that event, I am sure it will bring me great relief.

Another of my tormentors is a lean, withered exile, whose enemy is the Court of Austria. He is gradually scorching sere beneath the eye of Prince ———, which, he avers, is always upon him. He is full of horrible knowledge. He tells dismaying tales of secret police, who follow him closely as would his shadow, were there substance enough in him to make one. They hunt him from house to house, from hour to hour. In fear of these, he changes his lodgings every week, and his coffee-room every day. His eye is restless, his gait timid, his posture crouching, his step silent. He glides in upon me with whispers, and slinks away with silent signs.

This decaying martyr was once a tutor of princes, and afterwards an official of the Austrian Court. He thus became possessed of State secrets, which, if divulged, would set empires in arms; but he preserves them, and the world remains tranquil. If he were but to speak out! "Ah! Mister Rédacteur," he sometimes says, "you look to your Kveens, and your Ministeres, and your Parlements to give you your peace for long time to come; but it is here" (striking his breast) "vere de vurld's peace or var is decided! It is dese lips vich each morning for yeers on yeers has said to de vurld, 'Peace! be still!' It is he who vears dis tin, vorn coat, and dat skin bare ol' hat, who holds de dogs of var, and may any minute let dem slip over Austria, and Italy, and Poland, and France, and even over your England too!"

Twice or thrice a week this world's-peace-preserver comes with a little slip of intelligence translated from a foreign language to an unknown one, and from a newspaper to the inner side of an old envelope, announcing that an ingenious Frenchman has invented an apparatus for infallibly blowing out the brains of Emperors; or that an Italian Professor has secretly devised means for supplying unarmed peasants with a sure defence against the weapons of trained troops; or that a clever Pole is having manufactured at Manchester a machine which, by the aid of a single patriot, will simultaneously annihilate Moscow and Vienna. On finding (as he has hitherto always found) that his article is not inserted, he whines and trembles, and departs possessed of another undoubted proof of the successful operations of the aforesaid secret police.

He writes seven languages perfectly; yet he scarcely knows how to obtain bread, while we—who are much poorer linguists than he—fare sumptuously every day! This is his lamentation. The world, he is sure, is going to ruin—is going to madness at an alarming pace. Something is coming: we will see.

My literary friend, Lever (not Charles), is a lofty and poetical spirit, and extremely troublesome to me. He has in his time, which has not yet been a long one, conducted several remarkable journals; conducted them so successfully and so perseveringly that he has never left one until it

has become defunct. Encouraged by his own triumphs, and having had no fixed occupation for some months, he has generously interested himself in the condition of the *Meteor*, and considered how it may be improved. Its tone, he has found, is too low for its title. It does not sufficiently surprise and startle. It is rather the *Star* than the *Meteor* of science. The *Star* shines steadily on, the same now as twenty years since—the same now as twenty years hence. It is a useful and an interesting luminary, but it is without the power to strike the eye and amaze the mind. But the *Meteor* bursts forth with sudden light, and wakens more wonder than a sky of stars. You are startled by its splendour, and by its mystery also, for you know not whence it comes nor whither it goes, though it leaves a furrow of fire behind it. In like manner should the *Meteor of Science* rush forth with facts that excite and theories that astound. If he, Lever, had the tossing forth of it, would he not make it a *Meteor* indeed, dazzling all eyes!

I reply by suggesting that the *Meteor* is, in the main, what I wish it to be, and that its success depends upon the patronage of persons who do not wish to be dazzled. I assure him that, while nothing would be easier than to send forth each number with flaming paragraphs respecting submarine ships, and aërial railways, and semaphore telegraphs to the moon, and bridges across the Channel, and gold made from granite, and butter from coal (for I should simply have to publish what certain inventors daily write), these are matters respecting which engineers, and chemists, and geologists, and astronomers—among whom the *Meteor* circulates—take but the smallest possible interest. In short, I assure him, that the title of the journal is, in plain truth, a bad one; and that any periodical which resembled a meteor in respect of wildness, would inevitably resemble it in respect of duration, and never appear but once; and I affirm, that what men of business prize more than aught else is a faithful record of proven facts.

But Lever pities my poverty of soul, and in his pity is very persistent. He never allows many days to pass without dropping in upon me, and never drops in without discussing the *Meteor*, and never discusses the *Meteor* without cunning taunts and subtle sarcasms. I sometimes meet these with gentle resentment. I remind him that in matters of science I cannot defer to the judgment of a gentleman whom I once saw prostrate himself before a party of young ladies, and kiss the grass with tenderness, in token of his love of nature. I affirm that an editor who could not keep the *Spirit of Poesy*, or the *National Minstrel*, or the *Wonderful World*, or the *Christian Charmer*, or the *People's Choice* alive, has no good ground for raising editorial pretensions upon. I declare that the spirit of the man of science is impatient of declamation and display, and is so familiarised with the facts and laws of the universe, that it holds in contempt those minor marvels which charm the unitiated.

But I waste words on Lever. He is unwavering in his belief that I have the right place, and that he is the right man for it. He is equally fixed in his determination to drop in and represent the circumstance to me several times in each week. I should despair of any relief from his harassing visitations, had I not devised the following little scheme: I know a garrulous old capitalist, who insists on being my friend, and visits me accordingly. To him I am about to suggest the establishment of a weekly *Comet of Science*, with Lever for its editor, under his own superintendence. By these means I shall make two bores busy (which, of itself, will be an act of philanthropy), and gain for myself a respite which, though temporary, as it is certain to be, will be extremely acceptable.

My friend Marston, though one of the finest fellows on earth, is made a bore by an hallucination. He is of a noble nature, and has had an excellent education, which commenced early, and still progresses, although he is now in his fiftieth year. He has a knowledge of languages, if not profound, yet very general; his acquaintance with more than one branch of science is extensive; his love of art is pure and strong. He has travelled much in Europe, in the Americas, and in India; and has always journeyed with observant eyes. He has written much in newspapers, in magazines, and in reviews, and his contributions have always revealed vast knowledge, great originality and broad humanity in the writer. His physical aspect visibly corresponds with his character. He is tall, erect, broad-breasted, and has firm and pleasant features, a piercing eye, and a bright and massive brow. His rich and shining hair crowns his countenance with light. There are but few countries capable of producing a person at once so great, so strong, so genial, and so full of clear sense, and cheerful life as he.

But he has a singular notion respecting the designing of ships, which is now uppermost in him. Our entire mercantile and war navies are at sea in this respect. Neither Mr. Scott Russell, nor Mr. Green, nor Mr. White, nor any other constructor of ships is of the smallest professional worth in my excellent friend's estimation. They know

how to fine a bow here, and flatten a floor there, and lengthen a run elsewhere. They will pull the frame of this vessel to pieces to increase her breadth of beam, and cleave another through amidships to bring in an extra 20 feet of length; but produce a vessel that will exceed in speed a score of knots per hour they cannot. And the secret lies in this: they build ships that swim through the water like a fish, whereas a ship should glide over the sea like a skater. This is his discovery. Of course he is aware that a vessel at rest in a fluid will displace a body of it that weighs the same as itself. It is the motive power that is to bring the new vessel to the surface, and carry her along it. Place his patent inclined planes under her bows, and give her engines steam, or her sails wind, and up she will rise, and away she will career over fifty, eighty, or even a hundred knots an hour. In a day you may be in America—in four or five at Australia. These results accord, he avers, with the laws of nature. Certainly they accord with what appears to have become a law of his nature, notwithstanding its nobility. I have plied him with mathematics in all appropriate forms, but in vain. I have played upon him by the hour with the artillery of syllogisms, but without result. He still believes in his theory, and he still troubles me with it beyond measure. The eye of his faith beholds the skating ship, as other eyes have beheld other phantom ships; and I verily believe that when he comes to gaze upon the waters of death themselves he will see a swift ship skimming across them.

The *Meteor* is published precisely at two P.M. on Wednesday, and among the first of the purchasers is Mr. National Cadge. He is an infirm old man, and his pence rattle in his trembling hand as he puts them down in payment. The journal is always cut before it is handed to him by the shopman, for his feebleness is known and pitied. He then slinks away with it into a corner of the publishing office; and finding (as he invariably finds) that the name of National Cadge is not to be detected in it by the weak, anxious eye, he forthwith totters and tumbles up the stairs to me. Once more he mumbles forth the tale of his ancient wrong, and once more repeats now dark reproaches, and now golden promises.

The father of Mr. National Cadge was the son of a man who married the descendant of a person who introduced an important improvement in the tanning of skins. I do not just now remember the exact date at which this improvement was made, although I have heard it a thousand times; but it certainly was no longer ago than the reign of Edward the Third. The inventor, it appears, had, like many other inventors, lived and died in humble circumstances, and his lineal descendant, who, as has been stated, married the grandfather of the present Mr. Cadge, was in the service of a shoemaker's family at Stepney up to the time of the celebration of her nuptials. Through her the tradition of her ancestor's invention was transmitted, and her son (with whom she was favoured unusually early) was trained to revere his memory. As he grew up he became impressed with the conviction that a national tribute was due to him, as the descendant of one who had largely benefited the nation; and when he subsequently came to have a son of his own he christened him National, as a sign of the nature of the debt due to him. On the demise of his father, who was singularly unsuccessful in obtaining a general recognition of his claims, Mr. National Cadge consecrated his life to the pursuit of justice in respect thereto. Much of that consecrated life had been spent in disastrous disappointment when Mr. Cadge resolved to apply for legal advice, and was fortunate enough to consult a solicitor who entertained (and appeared to have entertained for years) precisely the same view of the case as himself. The two together are now pushing the matter forward with great zeal.

The solicitor has drawn up a petition to the House of Commons, setting forth the case at length, and the aspect which it has taken under his hands is indeed astonishing. The document shows, in impressive language, that there is no branch of industry or art upon which the invention of Mr. Cadge's grandmother's ancestor has not had the most enduring influence. The national health, the national wealth, the national strength, the national security, even the national existence—all have been preserved by means of the improved leather which, but for this invention, we could never have had; and, further, without this leather there would have been—there could have been—not the smallest fraction of that great development of machinery which has contributed so greatly to England's pre-eminence. The document shows all this, and much more.

Now, therefore, "the press must be worked." Already an Isle of Skye paper has come forth nobly upon the subject, and one American journal has given to the day the British governmental turpitude, by which the Cadges are impoverished and the nation is disgraced. It is said that the morning paper, the *Flag of Freedom*, has an article already in type, and that a printed copy of the petition will in a day or two be in the hands of the premier and the editor of the *Times*. But what is needed is aid

from the scientific press; especially a flaming article in the *Meteor of Science*. It is with this view that the creditor of the nation honours me with his presence. It is to this end that I have promises of a lion's share in a certain inheritance delicately proffered. Above all, it is because of the expectation of this that I am invaded by an infirm old fanatic every Wednesday, at 2 P.M., to my inexpressible annoyance. I am sometimes tempted to give the old fellow what he requires, and to make the *Meteor* declare the nation to be Cadge's debtor. But then I fear lest I should find the great weight of his gratitude even more burdensome than his present solicitations.

THE DESIGNS FOR A WELLINGTON MONUMENT.

The Exhibition now open in Westminster Hall, of models designed to compete for the Government Prize for a Wellington Monument, suggests serious reflections to cultivated minds. The greatness of the hero commemorated, the ardour of the nation's desire to do him honour, the solemn consciousness that exists of the present want of great military qualities in high places, and the universality of the competition which has produced these models, all conspire to give interest to the exhibition. But that which has most excited the public mind upon the subject is the sense that, of all the works of art there exhibited, not one is adequate to express either Wellington's glory, or the nation's admiration.

To design a monument to a man like Wellington is not a task for common minds. His qualities were such as men of ordinary endowments cannot understand or even see. His victories, his triumphs, the outward splendour of his achievements they may behold, and beholding, applaud. But the silent majesty of his nature, in which were combined an almost child-like devotion to duty and an almost god-like strength of will, eludes their apprehension. They may sympathise with his pride as a conqueror, but they are unable to share that mysterious magnanimity which enabled him to receive studied honour and rash contumely with equal docility, and which impelled him to follow only the guidance of his own genius and patriotism, leaving fame and fortune, either to overtake him in his noble course, or to abandon him altogether.

Yet surely these deeper qualities of Wellington are what we most need to commemorate, if possible, in his national monument, that we may thereby help to inspire the nation, in this age and in after ages, with a pure and lofty ambition. For this is now the design of monuments—to improve the living rather than to glorify the dead. Our Christian faith forbids the thought that the joys of the dead can be quickened or their griefs assuaged by earthly homage. But as the living may be exalted by their example, we would fain perpetuate the memory of their virtues, and it is for this cause that we build them monuments.

Hence we see why it is desirable to record, not the mere battles and triumphs of Wellington, but his zeal, his fidelity, his foresight, his constancy, his loyalty, his self-dominion. These are the virtues which make individuals strong, and nations invincible. A common man may face foes, and dispose battalions, and win victories. We have but little need to incite men to such deeds. But how few of us are true to duty, faithful under reproaches, quick to foresee dangers, swift to serve the state, loyal, simple, pure!

It would be difficult, we are aware, to fitly represent these qualities in sculptured stone—difficult, that is, nay, impossible, to an inferior genius. It is a task which requires great powers, and without these will never be accomplished. But in a sister art to sculpture it has already been nobly achieved. In Tennyson's "Ode on the Death of the Duke of Wellington," we have a great man's monument to this great man's genius—somewhat ruggedly wrought, it is true, but unique, faithful, magnificent, immortal. There we have, apart from its temporary funereal features, the embodiment of the noblest characteristics of the departed Duke. In it the nation learns, not merely that he was

> "Foremost captain of his time,"

but also that he was

> "In praise and in dispraise the same;"

that he

> "Never sold the truth to serve the hour,
> Nor palter'd with eternal God for power;"

that he was one

> "Whose life was work, whose language rife
> With rugged maxims hewn from life;
> Who never spoke against a foe;
> Whose eighty winters freeze with one rebuke,
> All great self-seekers trampling on the right;"

and—highest praise of all!—that he was

> "Rich in saving common sense,
> And, as the greatest only are,
> In his simplicity sublime."

These are elements of Wellington's character of which the nation has most need to be perpetually reminded. We desire to

> "Let his great example stand
> Colossal, seen of every land,
> And keep the soldier firm, the statesman pure;
> Till in all lands and through all human story,
> The path of duty be the way to glory."

To give form to this great example, and

to enable us to place its embodiment in the public gaze, was the task set before the competitors whose works are now submitted to our judgment at Westminster. That not one of these competitors has effected this we have no doubt whatever. Many of them are simply contemptible. In two of them the Duke is staggering in the arms of women. In others he is uneasily prostrate upon his back. In another he sits simpering before a lady who is showing him oppressive attentions. In another he is reclining upon a car drawn by very quiet lions. In several he stands half-naked among angels; and so forth. In five or six only is the man Wellington, whose genius and virtues are celebrated, represented as dignified in person and in associations, and in none of them is the true sublimity of his character expressed.

It may be thought by some unfair in us to criticise the Westminster models in this manner, without suggesting in some detail an appropriate form of monument. But to this we cannot assent. We lay no claim to the requisite ability for such a work. We presume merely to point out what requires commemoration, and not the mode of commemorating it. This we leave to the true artist, whose task it is. At the same time, we feel perfectly justified in condemning productions which could neither honour nor improve the nation that should adopt them.

THE ATLANTIC SUBMARINE TELEGRAPH.

We have received the following despatches during the past week respecting this undertaking.

Queenstown, July 30, 1857.

The entire squadron about to proceed to the consummation of this great enterprise, is anchored in the harbour of Queenstown. It consists of the *Niagara*, Captain Hudson; the *Susquehanna*, Captain Joshua Sands; the *Agamemnon*, Master-Commander Noddall; the *Cyclops*, Captain Dayman; and the *Leopard*, Captain Wainwright. The *Agamemnon* arrived this morning only, having been engaged during the trip from Greenwich in the very valuable service of testing practically the form and suitability of the machinery to be used for paying out the cable.

Mr. Charles Tilston Bright, the engineer in chief of the Atlantic Telegraph Company, having joined her at that place, she bore away for the Irish coast at half-past 3 o'clock on Monday morning last. To Mr. C. T. Bright is committed the entire control and responsibility of depositing the cable safely.

During the progress of the *Agamemnon* to the Downs the mechanical appliances for regulating the delivery of the cable into the sea were kept continually in motion by the small engine on board which is connected with them; the sheaves and gearing worked with great facility and precision, and so quietly that at a short distance from them their motion could scarcely be heard.

The strength of the girders which carry the bearing of the entire apparatus, and which to the eye of a person unskilled in the practical working of this description of machinery may seem at first to be unduly ponderous, was found to contribute greatly to the easy motion and satisfactory steadiness of this most important agent in the success of the undertaking.

So soon as the *Agamemnon* had passed the track of the Submarine Company's cable between Dover and Calais in order to avoid the possibility of its being injured by the laying or hauling up of another line at right angles to it, the experiments commenced. A 13-inch shell was attached to the end of a spare coil of the Atlantic cable, for the purpose of sinking it rapidly with a strain upon it to the bottom, and was then cast into the sea, drawing after it a sufficient quantity of slack to enable it to take hold of the ground and so set the machinery in motion. The paying out then commenced at the rate of two, three, and four knots an hour respectively. The ship was then stopped and the cable was hauled up from the bottom of the sea with great facility, by connecting the small engine to the driving pinion geared to the sheaves. When the end was brought up to the surface it was found that the shell had broken away from the loop, by which it had been fastened for the purpose of lowering it. The cable, when recovered, was found to have been cleaned as bright as the specimens which have been so freely distributed among the friends of the enterprise, and which are so generally known. The exterior coating of tar had been completely rubbed off by being drawn through the sandy bottom of the sea, and attached to the iron coating of the cable were some weeds and several small crabs which came up with it to the surface.

On the following day a length of cable was run out and hauled in with perfect success, opposite the Isle of Wight, attached to an anchor. The speed was increased in this case to five knots. During the afternoon of the same day a length was run out having fastened to the end of it a log of timber, and after having been towed with a mile and a-half of cable was coiled in again with success.

On Wednesday, about half-way between the Land's End and the coast of Ireland, another length was run out at the rate of six and a-half knots per hour, and subsequently hauled in. The *Agamemnon* then steered for Cork, and reached Queenstown

Harbour at 4 o'clock on Thursday morning, all on board being more than ever satisfied at the success of the enterprise.

Some highly successful experiments were also at the same time performed with an electrical log invented by Mr. Charles Bright, for the purpose of continuously ascertaining with accuracy the rate at which the ships are sailing, and thereby of enabling him to give corresponding directions as to the rate of paying the cable so as to prevent the possibility of any unnecessary strain being put upon it. The log is suspended in the sea from the ship's quarter by a line, carrying within it a wire insulated by gutta percha, which is in connection with a battery and electro magnet contained within an indicating instrument on deck. This is so arranged that at each revolution of the wheel below an electric current is broken, and by the deflection of a magnet which forms part of the circuit a step by step movement is communicated to a register which indicates the distance run and rate made by the vessel.

August 1, 1857.

The electrical experiments through the Atlantic cable will be completed to-day. The signals have passed through the 2,500 miles in the most satisfactory manner. The expedition will sail for Valentia on Monday at the latest.

Monday Morning.

The *Niagara* will this day finish taking in the heavy portion of the cable intended to be attached to the Valentia coast, which has to be unshipped from the *Agamemnon* and transferred to the *Niagara* in consequence of the starting points of the expedition being now from the Irish shore instead of from mid-ocean. The entire squadron will sail from Queenstown at 6 o'clock this evening, and is expected to reach Douglas Bay in readiness to commence operations to-morrow (Tuesday) morning.

His Excellency the Lord-Lieutenant of Ireland and staff arrived at Killarney at half-past 1, on their way to be present at the starting of the Atlantic Cable Expedition to-morrow. The directors and secretary of the company were in attendance to receive his Excellency.

August 3, 6 30 p.m.

All the ships are now steaming out of the harbour for Valentia.

A subsequent despatch is as follows:

On Thursday morning the *Agamemnon* came to moorings in Queenstown Harbour, at about a third of a mile from the *Niagara*. Before noon one end of each cable was carried to the opposite ship, and so joined up as to form a continuous length of 2,500 miles, both ends of which were on board the *Agamemnon*. One end was then connected with the apparatus for transmitting the electric current, and on a sensitive galvanometer being attached to the other end, the whole cable was tested from end to end, and found to be perfect.

The arrangements for attaching the recording instruments to indicate signals were left to be completed in the morning. The amount of electric power developed at the further end, and exhibited by Mr. Whitehouse's magneto-electrometer, amounted to an attractive force of 25 grains. As 3 grains are sufficient to record intelligible signals upon the receiving apparatus, it will be perceived that a considerable surplus of electric power remains, a convincing proof of the perfect integrity of the cable, and no less of the careful adaptation of scientific means to the desired object.

On resuming operations on Friday it was found that all communication was cut off; and after underrunning the portions of cable laid out between the two ships, it was ascertained that one had been completely severed by entanglement with the mooring chains during the time the *Agamemnon* was swinging with the tide, and that the other portion was so injured from the same cause as to be unfit for use.

During Friday the officers of the company were engaged in releasing the broken wires and reconnecting the conductors.

On re-establishing communication between ship and ship, the transmission of electric telegraph messages through the entire length of 2,500 miles was immediately commenced, and proceeded satisfactorily during the whole of Saturday.

In carrying this out, each terminal station or end of the cable was separately connected with the earth, as is usual in lines laid out in actual length, and the electrician noted that a considerable interval of time elapsed during the passage of the current, the amount of retardation being equal to nearly a second and three-quarters upon each electrical wave or signal. Yet, notwithstanding this, it was found that three signals could be practically and intelligibly transmitted in two seconds. This confirms the accuracy of the previous experiments made upon shorter circuits of wire, by which it had been demonstrated that several waves of electric force can co-exist in a long unbroken length of completely insulated conducting wire, and yet reach their terminal destination with sufficient intervals between them to record intelligibly the indications they are intended to convey.

The battery employed by Mr. Whitehouse consists of a voltaic series of 40 cells, the plates of which are formed alternately of zinc and platinized silver, each about nine inches square. The exciting fluid or medium is simply diluted sulphuric acid, the

troughs containing which are swung upon a gimballed frame, to prevent the fluid from being washed over the connections between cell and cell by the motion of the ship.

The force developed by this battery in its direct action is so great that a piece of iron three inches long and three eighths of an inch in diameter can be entirely consumed in a few minutes by the heat developed on retaining the two poles of the battery simultaneously in contact with it.

The battery current thus generated is, however, only the primary agent in the act of telegraphing through the cable, and is solely used as a means of inducing, through the aid of electro-magnetic electricity, a current of a suitable character for being transmitted through such long distances. The electro-magnetic electricity actually employed is obtained from large induction coils.

Provision having been made in this manner for the through transmission of the electric current, the adaptation of an instrument suitable to the indication or recording of signals is simply a matter of mechanical ingenuity, and any of the sensitive indicating or recording instruments now in use may be employed for the purpose.

The form of instrument at present used for developing signals by the Atlantic Telegraph Company is a modification of the well known marking instrument invented by Professor Morse.

The British and Irish Magnetic Telegraph Company are progressing very rapidly with the erection of an overground line of telegraph along the highway between Killarney and Valentia for the purpose of connecting the existing telegraphic system with the Atlantic cable at the latter place, by means of which, under an arrangement entered into between the magnetic and electric companies, the whole of the lines in the three kingdoms, 10,000 miles in extent, will be available for the rapid transmission of intelligence between Europe and the American continent.

The line is already completed beyond Killorglin, where the Magnetic Company have established a temporary station.

The entire through communication to Valentia is expected to be completed by the middle of next week, when intelligence as to the progress made in the paying out of the cable will be daily received and sent forward by Mr. Saward, the secretary of the company, who will remain there with the staff of manipulators untill the completion of the undertaking.

(BY BRITISH AND IRISH MAGNETIC TELEGRAPH.)

Valentia, Wednesday.

The *Niagara*, the *Susquehanna*, the *Agamemnon*, the *Leopard*, the *Cyclops*, and the *Advice*, have arrived at Valentia, all well. The *Arctic* and the *Victory* are at Trinity Bay, where they will wait the expedition, and will then assist in landing the Newfoundland end of the cable. Everything is in complete readiness for effecting the landing of the Irish end; a favourable spot has been selected on the shore of Valentia Bay, about three miles from Cahirciveen, and the operations will be commenced immediately the weather will permit. The Lord Lieutenant is at Valentia, to inaugurate by his presence the undertaking. A grand banquet was given yesterday to his Excellency and the directors of the company by the Knight of Kerry. The most complete confidence prevails as to the undertaking.

The following despatch was received from a correspondent in Ireland on Thursday morning:

"The vessels containing the submarine cable left Queenstown Harbour, *en route* for Valentia, on the evening of Monday. During their stay at that anchorage the two cables were connected, and the time occupied in traversing the 2,600 miles was ascertained to be one second and a quarter. From experiments instituted whilst the two coils were in connection, the maximum obtained was an average of seven words per minute, five being the minimum. Opinions are, however, entertained by some that, when submerged, and the wave of electricity not compelled to take such a series of circles, a higher rate will be obtained. Some difficulty was experienced in coiling the inshore portion of the cable on board the *Niagara*, which caused a slight delay, it being of much greater strength, and far more difficult to manage than the smaller."

By a still later despatch, we learn that the end of the cable was laid in Ireland on Wednesday evening by the Lord Lieutenant.

[We have been requested to publish the following letter by Messrs. Newall and Co., the substance of which has appeared elsewhere, but which nevertheless should, it is thought, be placed on record in our pages.]

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—We observe in the *Times* of the 24th inst. a statement regarding our manufacture of the Atlantic cable, which is untrue, and damaging to our reputation: we therefore request you to be so good as to insert this contradiction of it in your next impression.

The statement is this:—"In consequence of the two halves being made at different places—one at Birkenhead by Messrs. Newall, and the other at Greenwich by Glass and Elliott—a most egregious blunder has been committed. It will scarcely be credited, but it is nevertheless true, that the twist of the spiral wires of the Birkenhead half is in exactly the opposite direction to the twist of the wires in the half made at Greenwich. . . . . . We are informed that Messrs. Glass and Elliott had nearly 100 miles of their portion of the cable

completed before Messrs. Newall and Co. commenced theirs, and that, therefore, the fault rests with the firm that began last."

Never were more illogical conclusions drawn than the two contained in the above statement, for it was not at all "in consequence of the two halves being made in different places" that the twists were the one a right hand and the other a left-hand, nor was it because Glass and Elliott had 200 miles (not 100, as stated in the *Times*) manufactured before we began, that "therefore the fault rests with the firm which began last."

The facts are simply these:—On the 8th of November last, we were asked to tender for a part or for the whole 2,500 miles of cable required by the Atlantic Telegraph Company; and to enable us to make the calculations required, a specimen of cable, about 3 inches long, was given to us by one of the Provisional Directors. That specimen has remained in our possession. It is laid to the *right hand*, as ropes *almost invariably* are, unless ordered to be made *left-hand* for some special reason or purpose.

After our tender was sent to the Provisional Directors, on the 10th of November, the Permanent Directors were elected, and the engineer and electrician appointed. They sent us a specification, founded on the specimen previously given to us, and requested us to renew our tender, which we did.

In this specification there is no mention whatever made of a right or left-hand cable. We, however, manufactured a piece of *right hand* rope, like the specimen first given to us, *one-half of which we deposited with the Directors*, and the other half we kept in our possession. On the 18th of November, the Directors accepted our tender for 1,250 miles of this cable, and Messrs. Glass and Elliott's for the other half.

In the end of February we began the manufacture of the cable. Messrs. Glass and Elliott began on the 7th of December, and on the 1st of March were about 200 miles ahead of us.

In accordance with the contract, we sent the first sixty feet we made for the inspection and approval of the company. This, after having been tested and found to bear 81 cwt., instead of 62 cwt. as per contract, was approved of by the engineer of the company, who at the same time found out that the lay of the two halves was different, and asked us to alter ours, and make it left-hand. We informed him that all our machinery was made for right-hand rope, and that we could not alter it without great expense and delay; and as it was according to the specimen deposited, he could find no fault with it, and he decided against alteration. Had it been our fault, we could have been compelled, under the contract, to have altered it, and would have been liable to a penalty of £50 for every day's delay in delivery of the cable after the 30th of June. We, however, finished the manufacture on the 8th of June, at which time Messrs. Glass and Elliott were more than 300 miles *behind* us. *That* was said to be the fault of "all the wiredrawers in England."

You will perceive, from these facts, that our half of the cable has been made according to the contract, and that, though we were the last to begin, we were the first to end, and that no blame can attach to us for the "egregious blunder" which has been committed in the difference of the lay.

As we have no connection with the firm at Greenwich, probably the engineer of the company, whose duty it was to superintend the entire manufacture, or the *Times* correspondent at Greenwich, can explain how the cable made by Messrs. Glass and Elliott happened to be different from the specimen given to us.

We take this opportunity of stating that we are in no way responsible for the kind of cable selected by the company; nor have we had anything to do with the arrangements for laying down the cable.

We are, Sir, Your obedient servants,

Gateshead, July 29. R. S. Newall and Co.

TIZARD'S PATENT BREWING APPARATUS.

Mr. W. Littell Tizard, of Plymstock, Devon, Author of a Practical Treatise on Brewing, has patented an improved fermenting, cleansing, and attemperating apparatus to be employed in brewing. The apparatus consists of a vessel formed and operating as hereafter explained, and made nearly to fit the interior of a fermenting tun, and form a rising and falling cover thereto; the top and bottom of this cover are a few inches apart, and the cover forms a receptacle for hot or cold water. Its bottom is convex, and its upper part flat or slightly concave, with an outer edge or rim rising above the flat part. It is furnished with ingress and egress pipes for keeping up a continuous flow of water through it; one, two, or more tubes, an inch or two in diameter, more or less, are made to pass through the apparatus, and descend a few inches below its bottom: these tubes are furnished with plugs, and may have fitted to them pipes leading to the bottom of the tun. The bulb of a thermometer, with its tube bent at right angles, may advantageously be inserted into the side of the tun, with its index on the outside, so as to indicate at all times the temperature of the wort or beer. Above the tun is placed a water tank, supplied with either hot or cold water. The operation of the apparatus is as follows:—Prior to pitching a gyle of wort, the hollow vessel is lowered into the tun. The pitching yeast, which is intended to excite vinous fermentation, is placed on the apparatus and blended with the wort as it flows from the cooler or refrigerator. Cold water is now made to flow through the apparatus, which performs the office of a secondary refrigerator to the wort as it passes over the surface thereof down one or more of the descending tubes into the tun.

Supposing the gyle to be pitched, and the apparatus to be resting on its surface, then, on the commencement of fermentation, the yeast and its accompanying wort rise up around the rim of the apparatus, and fall on its top surface; the most fluid parts find their way down the descending tubes before mentioned into the tun, again and again to be returned to the apparatus, until the process of fermentation ceases. During fermentation, either hot or cold water may be passed through the apparatus to attemperate the contents of the tun and the worts or beer which circulate over and through it. The attenuation of the gyle being nearly perfected, the plugs are now placed into the tubes to prevent any yeast running into the tun. The yeast then rises in a more solid form, and continues to be received on

and retained by the apparatus. Just before fermentation ceases, the plugs are withdrawn to allow the clean beer that has subsided from the yeast to flow through the tubes into the tun, the yeast being either too solid to follow, or prevented from doing so by guard rings or ferrules of from half to two inches high placed around the mouth of the tubes. The yeast may now be removed, and the gyle kept at the temperature of not higher than 58° F. until the gyle of beer has become sufficiently fine for its destination. Prior to racking, the apparatus must be disengaged to allow of its being lowered so as just to float on the surface of the beer at any depth it may assume during the period of its being racked off.

In the annexed engraving is shewn in sectional elevation a tun with the improved apparatus applied thereto. A is the tun or vat; the fermenting, cleansing, and attemperating apparatus consists of a hollow metal vessel, B, through which a current of water of the desired temperature is made to flow by the inlet and outlet tubes, F and G. The apparatus is made to float on the surface of the beer and form a cover thereto, by means of the counter balance, E. Sufficient space must be left between the sides thereof and the tun, to allow of the yeast rising through the same, and flowing over on the top of the apparatus. H is a tube passing through the apparatus, and J, a plug to the same. Two or more of such tubes and plugs may be fitted in a similar manner. I is a flexible pipe, which may or may not be used, as desired. This pipe fits on to the bottom of the tube, H, and conveys the beer after settling from the yeast on the top of the apparatus to the bottom of the tun, without disturbing the head of the gyle. K is a cock for drawing off the contents of the tun.

IMPROVED COVERS FOR GAS-LAMPS.

THE glass globes, termed "sanitary moons," which are frequently suspended over gas-lamps, are well known to effect, in a very perfect manner, the dispersion of the products of combustion, and the prevention of deposits of carbon upon ceilings, &c. But these globes are frequently found to break and fall, thereby greatly damaging the tables beneath, and the cloths and other articles upon the tables. In order to get rid of this inconvenience, Messrs. Pettit and Co., gas engineers, of Oxford-street, London, have patented an improved cap or cover, which is placed over or upon the chimneys or globes of gas and other lights. Their invention consists in the combination of a metal or other frame fitted over, or upon, or formed in a piece with the glass chimney or globe, with a cover of mica or talc. The mica or talc may be in the form of a flat disc, or of a cone, or of any desired shape into which it can be formed. By this combination of a frame and a cap or cover of mica or of talc, they

secure great lightness, avoid all danger of damage from accident, effectually prevent the products of combustion from blackening anything which may be over the light, and, by taking care to allow sufficient space between the surface of the talc and the upper edge of the chimney or globe, provide for the passing off of the products of combustion, which are, in effect, divided into numerous currents, and driven out all round the edges of the mica or talc cover. In the accompanying engravings several modifications are shown. A is the ordinary glass globe, B B the frame, and C the mica or talc. The arrangement in which a simple plate of mica or talc is supported by three light metallic rests is preferred.

THE LEWISHAM RAILWAY ACCIDENT.

To the Editors of the Mechanics' Magazine.

Gentlemen,—May I ask the favour of your inserting a few remarks from me respecting the melancholy accident that took place near Lewisham on the 28th of June, and many others of the same kind. With all the appliances in existence, there would seem to be a miserable deficiency of means to prevent such misfortunes. I deny that the means used were in any way adequate to prevent such a calamity. The guard might be seen or not seen, with his puny red light, by the engineman, without any sufficient charge of neglect on his part. Circumstances might intervene that would commit the best man that ever drove an engine. Allow me to contribute my mite to the stock of preventives of such fearful loss of life and property. In my judgment, the guard that runs down the line to prevent the approach of any train that is expected, should have proper means for greasing the rails for ten or fifteen yards, at the greatest possible distance from the standing train. The moment that the engine reaches the greased place of the rail its power is completely neutralised, and there is nothing to propel it forward but its momentum; while the engineman both sees and hears from his chimney top that he is to stop without loss of time, and by bringing his engine wheels to a stand still, and by putting on his sand apparatus, he will bring his engine to a dead lock within a hundred yards of the greased place of the rail. The experiment can be proved without expense. I have no doubt of its efficacy.

Your inserting the above remarks will greatly oblige. I am, Gentlemen, &c.,

David Hope.

Railway-terrace, Bishops Auckland,
Durham, July 4, 1857.

[Mr. Hope has obtained provisional protection for an invention embodying the above suggestions.]—Eds. M. M.

THE HYDRAULIC PILE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—It seems increasingly true that "there is nothing new under the sun;" and if men of talent, and especially men of genius, would content themselves with utilizing the detached data developed by ages, instead of contending for priority of invention—a thing that seldom holds water—they would sooner arrive at excellency and great usefulness, and avoid much mortification. If Mr. Burcham had used common diligence at the Patent Office, and in reading extant works, you need not have quoted for his information, and there would have been no room for scepticism upon my assertions. The hydraulic wharf is an unintelligible thing to me. The elaborate models of the hydraulic dock were sent of course to Mr. Pitcher, but they are now in my possession, and at the service of Mr. Burcham or any interested party. This gentleman does not, I presume, question the fact and use of this dock in America years before 1845. The "curious coincidence," therefore, falls to the ground.

You conclude your remark with allusion to the fact that Evans did not propose hollow piles with pistons. Herein I consider him to be more simple, inexpensive, and durable than his successors, having no machinery out of sight, and two hydraulics instead of forty, which these hollow piles provide for.

My object is the maturity of the means for repairing ships, especially abroad, where any complication defeats the object from the want of scientific resources to lay down or repair. I am obliged to Messrs. Evans, Clark, Burcham, and others, and if forty years' *practical use* of docks and heaving-up slips, and the construction of the whole, can advance the object, they can command it from Yours obediently,

THOS. WHITE, jun.

MISCELLANEOUS INTELLIGENCE.

THE CLIPPER TRANSPORTS AT PORTSMOUTH.—Much interest has been created during the week amongst naval men at Portsmouth by the appearance of three of the largest of the noble clipper ships taken up for the conveyance of troops to India, equipped with Mr. Cunningham's admirable invention for reefing topsails, &c., from the deck, now so generally known as "Cunningham's Patent Self-reefing Topsail." They consist of the *Champion of the Seas*, *Golden Fleece*, and *Lady Jocelyn*. The former ship has just returned from a voyage to Australia with the rig, and Captain M'Kinder speaks in the highest terms of its many advantages; and the *Golden Fleece*, after having gone a voyage to Brazil with two topsails, has now a third one fitted, which evidences the opinion of her commander, at whose request it has been done. It was the opinion of naval men that Mr. Cunningham's invention would not answer on large ships; but the perfect success of it on board the *Champion of the Seas*, whose topsail yards are heavier than those of a 90-gun ship, clearly proves that the application of it is unlimited, and that Mr. Cunningham has completed a work of innovation in navigation that must be considered as one of the greatest improvements of the age. It is pleasing to observe that the naval world is beginning to recognize the value of Mr. Cunningham's labours. A practical and intelligent officer, who lately commanded one of H. M.'s screw steam-frigates, writes of it as "the most valuable invention of modern times, and may lift up its head even against the marine steam engine;" and the lively interest which has been exhibited at Portsmouth on the occasion of the visit of these large ships with the "Cunningham system," evince that the navy, although disinclined to adopt such a vast innovation itself, at least appreciates the value of it.

ARTIFICIAL GOLD.—Messrs. Mourier and Vallent, of Paris, have succeeded in forming an alloy which very closely resembles gold. The materials and proportions used by them are, pure copper, 100 parts (by weight); zinc, 17; magnesia, 6; sal ammoniac, 3·60; quick lime, 1·80; tartar, 9. The copper is melted in a crucible, in a suitable furnace; the magnesia, sal ammoniac, lime, and tartar are then added, separately and by degrees, in the form of powder; the whole is stirred for about thirty minutes to thoroughly mix the ingredients, and the zinc is then thrown on the surface, having first been ground into very small grains; the stirring is continued until the fusion is complete. The crucible is now covered, and the fusion continued for about thirty-five minutes, when it is uncovered and skimmed with care, and the contents are run into a mould of moist sand or metal. The material which results may be cast at such a temperature that any ornamental forms may be given to it. It is very fine grained, and is also damascene, malleable, and capable of taking a very brilliant polish. When tarnished by oxidation, its brilliancy can be restored by a little acidulated water. If tin be employed instead of zinc, the alloy will be still more brilliant.

EXPERIMENT IN PHOTOGRAPHY.—Mr. Waterston, in November, 1855, made some experiments at Bombay, for the purpose of estimating the limit of the photogenic action of the direct solar rays. He wished also, if it were possible, to measure

the diameter of the sun within a small fraction of a second, by combining the photographic and the electric telegraphic processes, employing photography to estimate the element of space, and the telegraph to estimate the element of time. The general result of the first experiment is, that it requires an exposure to the direct light of the sun for one twenty-thousandth part of a second in order to obtain on a plate coated with collodion a distinct impression, which may be completely developed by the ordinary processes.

PLOUGHING BY STEAM.—Provisional protection, under the patent law of 1852, was recently obtained for an arrangement of steam-ploughing apparatus by Mr. Boydell, the inventor of the endless railway, Mr. Burrell, of Thetford, and Mr. Hamilton, of Acton. In this invention several ploughs are used at the same time, and they are connected to a locomotive engine in such manner that the last of the series of ploughs may be still drawn forward toward the headland whilst the locomotive engine is turning at the headland. Each plough is made with a single handle, and the depth of ploughing is governed by wheels attached to each plough. In order that one man may guide two ploughs, the ends of the handles of two neighbouring ploughs are made to terminate opposite each other. The series of ploughs (used at one time) are connected by the four ends of their beams to a bar, which is at all times held in a direction inclined to the back of the locomotive engine, in consequence of the bar being connected to the whipple-tree at one end by a long chain or links, and at the other end by a short chain or links. The whipple-tree is connected at the middle of its length to the hinder end of the locomotive engine, in such manner that it can be drawn thereby either when parallel or at an angle to the back of the engine. From this arrangement it results that when the locomotive engine has arrived at the headland, and is turning, it will still continue to draw forward the hinder ploughs, though the first of them have come up to the headland. To facilitate the working of several ploughs one after the other, the beams of each pair, or of more, are connected by two connecting rods and pin-joints to each other.

MR. BESSEMER AND THE IRON MANUFACTURE.—Mr. H. Bessemer has patented another improvement in the iron manufacture. It consists in manufacturing sheets, plates, bars, and other forms of iron direct from fluid malleable iron, in place of allowing the same first to cool and set in moulds. For this purpose it is preferred to fix a pair of rolls with their axes in a horizontal position in a suitable frame, the rolls being placed side by side on the same level, and having openings in the centre of them for the purpose of allowing a stream of water to pass through and absorb a portion of the heat communicated to the rolls by the molten metal. In addition to this method of cooling the rolls, Mr. Bessemer also provides a means of lowering their temperature by the application of water to their external surfaces. The same improvement is applicable to the manufacture of sheets, plates, bars, &c., of steel.

GOSPORT DEFENCES.—We find an article in that excellent journal, the *Mechanics' Magazine*, for July, devoted to the new works of defence at present in the course of construction in our neighbourhood, containing a suggestion for rendering Haslar lake available at all times of tide for the hauling-up or launching of gun-boats—a branch of the navy which is likely to have additional proof of its efficiency demonstrated, and the necessity of the aid of which being available at an hour's notice cannot be too strongly advocated. We believe a suggestion for the damming of the water above the bridge was submitted to the authorities at the close of last year, but, up to the present time, no alteration has been made. Any person possessing even the most remote acquaintance with the lake will agree with the assertion in reference to the excellence of the situation for wet docks. Many years ago the lake was inspected and pronounced as a most eligible situation for commercial docks, both below and above the bridge, its proximity to, and very easy access from, one of the finest and best sheltered roadsteads in the world, Spithead, being among the many claims for its adoption; but want of energy and decision on the part of those who should have been the most ready and anxious to secure to our town and the port of Portsmouth generally the advantages and improvements which would necessarily have followed the establishing of such docks, allowed the opportunity to glide away—to be grasped by another port, farther away, and the approach to which is by a tortuous and difficult channel, but where men were to be found possessing the requirements of capital, energy, and promptitude of action.—*Hampshire Telegraph.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

BROADLEY, J. *Improvements in weaving.* Dated Nov. 24, 1856. (No. 2782.)

These relate to the weaving simultaneously of two or more breadths of fabric side by side in the same loom, which breadths

are connected together in the weaving by the weft threads, and afterwards separated by the cutting up or across of such weft threads, as in the patent of F. W. Mowbray, 23rd June, 1855.

LEWSEY, C. J. *Improvements in sugar-cane mills.* Dated Nov. 24, 1856. (No. 2785.)

The improvements here have for their object to apply in lieu of the massive side frames or standards of cast iron heretofore used, wrought iron standards composed of numerous plates, so connected as to present great strength, and at the same time the strain is more equally distributed.

BRICKLEY, H. *Improvements in mills for grinding.* Dated Nov. 24, 1856. (No. 2787.)

This invention cannot be described without engravings.

HEINKE, C. E. *Improved apparatus for illuminating objects beneath the surface of water, or for giving light in mines and other places where combustible or explosive gases exist.* Dated Nov. 24, 1856. (No. 2788.)

This consists in supplying air to the burner to support combustion, and also the application to submarine and other analogous illuminating apparatus of a hollow air chamber into which air is forced from above by forcing apparatus, to supply the lamp placed inside with air to support combustion. It further consists in the application of condensing lenses and reflectors, for the purpose of concentrating or throwing the light in any desired direction.

ORR, J. *Improvements in the manufacture of pile fabrics.* Dated Nov. 24, 1856. (No. 2789.)

Here the fur pile or chenille is woven in a harness loom, in which the pattern in the fabric is usually produced by a jacquard machine. The lathe or lay is constructed with two or more shuttle boxes and shuttles, by means of which wefts of different colours may be thrown through the shed, and thereby give a greater variety of colour to the woven fabric.

BRAGG, H., jun. *Improvements in drying or extracting moisture from air, and in machinery or apparatus for starching, clearing, drying, stretching, and finishing fabrics.* Dated Nov. 25, 1856. (No. 2792.)

In drying or extracting moisture from air, quick lime or deliquescent salts or acids are forced through it. When the air has been thus dried, it may be collected in a receiver, or may be conveyed direct to the apparatus where it is to be employed. The improvements in starching and clearing fabrics consist in confining them in air-tight vessels, and therein subjecting them to the action of compressed air, and to partial vacuum. The effect of this compressed air and partial vacuum on the fabrics is to force the starch, size, &c., into the threads of the fabric, and to clear the same from the interstices or meshes of the fabric. The remainder of the invention cannot be described without engravings.

BOUGLEUX, H. *Improvements in the construction of steam boilers.* Dated Nov. 25, 1856. (No. 2793.)

In this invention those parts of a boiler which are heated have vessels fixed on the inside within an opening for each through the boiler. These internal vessels are of larger diameter beyond the openings into them than at the openings, the object being to form receptacles for the heated products from the fire.

PALMER, J. *Improved means for separating different kinds or qualities of seed or grain from each other.* Dated Nov. 25, 1856. (No. 2795.)

The patentee applies to the interior of a rotating cylindrical screen sets of segmental partitions, which fit close against the cylinder from end to end thereof. These partitions distribute the grain, and present a large surface of grain to the meshes of the screen. They further arrange the individual seeds in a direction parallel with the meshes of the screen, and thereby facilitate their escape through the screen.

ELKIN, J. L. *An improved process applicable to the manufacture of zinc.* (A communication.) Dated Nov. 25, 1856. (No. 2796.)

Claim.—Obtaining metallic zinc from grey powder, or grey oxide of zinc, or other substance containing that metal in a finely divided state, by heating such substance a little above the melting point, and then agitating and applying pressure to the heated mass for the purpose of causing the small particles or globules to agglomerate, so that the melted metal may be run out into moulds or otherwise.

MARSHALL, J., jun. *An improvement in the purifying of oils and fatty matters.* Dated Nov. 25, 1856. (No. 2797.)

The patentee runs the oil, &c., into a water tight cylinder with supply and discharge pipes. Water at a pressure is then let into the cylinder, and pressing upward on the oil forces the same through the discharge pipe.

NEWTON, A. V. *Improved machinery for forging iron.* (A communication.) Dated Nov. 25, 1856. (No. 2798.)

This cannot be described without engravings. The patentee claims—1. The arrangement of the four hammers operating in pairs, and actuated by a single central cam. 2. The hollow driving shaft and perforated cam operated as described.

MUSGRAVE, J., jun. *Improvements in the construction of cloth beams for beetles.* Dated Nov. 26, 1856. (No. 2799.)

This consists in constructing the cloth beams for beetles of wrought-iron plates. The centres of the beams are either rivetted or otherwise attached to the ends of the beam; or an axle passing through the beam, and projecting at each end, may be used.

BROWN, J., and J. ADIN. *Certain improvements in jacquard machines.* Dated Nov. 26, 1856. (No. 2800.)

This relates, principally, to double-lift jacquard machines, or those in which a portion of the hooks are raised while the others are drawn down to form the shed, and consists—1. In a combination of parts for giving motion to the cylinder or drum. 2. In a mode of connecting the grife to the healds or harness. 3. In an improved mode of connecting the grife to the bottom board so as to produce an even shed, and in connecting the hooks to the needles.

CLERK, F. N. *Improvements in metallic roofing for buildings, and in appendages to roofs.* Dated Nov. 26, 1856. (No. 2802.)

This consists—1. In constructing roofing plates in the ordinary way, excepting that a projection is raised in such part of the plate as it is intended to pass a nail or other fastening through. 2. A rain-water head for receiving water from the eaves gutters of the roof is constructed in the following manner:—The front and sides of the said head are formed of one piece of metal, which is fashioned into the required shape by stamping or by pressure. 3. A moveable ear for fastening rain water pipes to the wall or other portion of the building. 4. A bracket or holdfast for securing or holding eaves gutters and preventing them from leaking. The bracket is made of wrought iron, and has constructed thereon a shoulder, to allow the gutter to go up close.

NEWTON, A. V. *An improvement in the process of coating iron bolts, bars, sheets, spikes, nails, and other articles of iron, with metallic alloys, for the prevention of rusting or oxidation.* (A communication.) Dated Nov. 26, 1855. (No. 2805.)

Claim.—The employment of muriatic, nitric, or sulphuric acid (of ordinary concentration, viz., muriatic, of 18° Beaumé; nitric, 38° Beaumé; and sulphuric, 66° Beaumé, or thereabouts), without dilution, combined with the introduction of spelter into the cleansing acid, and the passing the cleansed articles directly into the metallic bath, without any intermediate treatment.

PALMER, H. E. *Improvements in photographic apparatus.* Dated Nov. 26, 1856. (No. 2806.)

This consists in a method of arranging photographic cameras and apparatus so that the plate may be rendered sensitive, and the picture developed and fixed within the chamber of the camera.

LEES, A., and D. SCHOFIELD. *Certain improvements in self-acting mules for spinning and doubling.* Dated Nov. 27, 1856. (No. 2807.)

This relates to the copping motion, and consists in the application of a copping rail, supported by double shaper plates, for effecting the same object as the copping rail and shaping frame required in "Richard Robert's patent self-actors." It also consists in the mode of regulating the longitudinal position of the copping rail, and in supporting the stud of the coil that travels along the copping rail in two levers.

FONTAINEMOREAU, P. A. L. DE. *Improved weighing-apparatus.* (A communication.) Dated Nov. 27, 1856. (No. 2808.)

This consists in applying the principle of the displacement of water to the construction of apparatus for ascertaining the weight of bodies by means of a scale adjustable according to the nature of the liquid.

WOOFE, W. *An implement for paring land, applicable also to the removing of turf.* Dated Nov. 27, 1856. (No. 2810.)

This invention was described and illustrated at page 487 of vol. lxvi.

HEDGELY, H. *Certain improvements in spirit lamps.* Dated Nov. 27, 1856. (No. 2812.)

The inventor constructs the lamp with an argand burner, and directs a continuous current of air between the outer surface of the wick and the outer case of metal which encloses the wick by puncturing the case.

GRIFFITHS, R. *Improvements in vessels and engines for propelling vessels.* Dated Nov. 28, 1856. (No. 2813.)

This consists—1. In constructing the bows of vessels so that when under weigh the water will be driven upwards, thereby causing less resistance to the vessels. 2. In the application of an apparatus on the bow of a vessel which will be put in motion by the resistance offered to it from the water when the ship is under weigh, so that the power thus obtained is made available as an auxiliary to the prime mover. 3. In forming the keels of vessels hollow underneath, so as to stiffen the vessels. 4. In a mode of arranging the engines for propelling vessels on or between the boilers.

WALKER, P. *Improvements in brewing, and in the machinery or apparatus employed therein.* Dated Nov. 28, 1856. (No 2814.)

This consists in pouring the boiling wort on the hops to obtain an infusion, instead of boiling the hops in the wort, and the hops may be cut into small pieces previous to

obtaining the infusion by passing them between a roller covered with teeth or cutters. It also consists in machinery for cooling the vapours of the yeast chamber; and in the application of cooling pipes for reducing the temperature of ale, beer, or porter, when in barrels.

HIGGIN, J. *Improvements in treating certain vegetable dye stuffs, or preparations therefrom, so as to obtain a colouring substance of increased purity.* Dated Nov. 28, 1856. (No. 2815.)

Madder and plants of the same species and preparations therefrom contain pectine, pectic acid, resins, &c., which do not act as true colouring matters, but become attached to the mordants during the process of dyeing, and are otherwise injurious. The patentee acts on dye stuffs so as to prevent the effects of the above-named injurious substances, by either removing them wholly or in part by substances capable of dissolving them, or by forming compounds with them insoluble in water to prevent their action during dyeing.

TISSOT, C. A. *Improvements in the production of motive power, and in the apparatus connected therewith.* Dated Nov. 28, 1856. (No. 2816.)

This consists—1. In the employment of ether combined with fatty, empyreumatic, or essential oils, to replace steam as a motive power. 2. In the arrangement of engines to which this source of power is applied.

CELLIER, A. *An improved mucilage, applicable to the sizeing and printing of textile materials.* Dated Nov. 28, 1856. (No. 2817.)

The patentee places in ten pints of water half a pound of lichen or pearl moss, and boils it for five minutes, and then steams off the liquid, which in cooling forms a paste.

SAUNDERS, J. M. *Improvements in cooking ranges.* Dated Nov. 28, 1856. (No. 2818.)

The appearance of this range is like a close fire cooking apparatus, being supplied with fuel from the top like a common hot hearth. The fuel is put into a small fire pot, which is let down from the hot plate into a seat or bed formed in the roasting screen. Various other arrangements are included.

SOURBUTS, H. T. *Improvements in taps or valves, part of which are applicable to lubricators for steam engines and other purposes.* Dated Nov. 28, 1856. (No. 2819.)

This consists in making the plugs of taps or valves hollow, so that the passage, instead of going directly through the plug, will enter at one part of it, pass along it, and leave at another part of it.

WALLER, H. *Improvements applicable to vessels used in the manufacture of cheese.* Dated Nov. 28, 1856. (No. 2820.)

The patentee employs an ordinary vessel without strainer, and after the curd has been cut up by the ordinary means, he places on the surface of the contents of the vessel a finely perforated plate or compressor, which fits closely the inside of the vessel. This plate sinks, carries the curd with it, and leaves the clear whey above.

TURNER, A. *Improvements in the manufacture of elastic fabrics.* Dated Nov. 28, 1856. (No. 2821.)

This relates to producing an ornamental edging on that kind of elastic fabric which is made in braiding or plaiting machines by breaking the straight line that has heretofore been made, and imparting to the edges of the fabric a serrated or indented appearance.

TAYLOR, J. G. *Improvements in pencil cases.* Dated Nov. 29, 1856. (No. 2823.)

This consists in the employment of grooved, screwed, and studded cylinders, by which the patentee combines the propelling or withdrawing of the lead through the point of the case, and the propelling or withdrawing of the case into or out of the outer case.

SIEMENS, C. W. *Improvements in fluid meters.* Dated Nov. 29, 1856. (No. 2824.)

The patentee places within a case two flexible diaphragms united by transverse partitions, in which are slots traversed by a helical spindle having a series of cranks or eccentrics arranged in a helical form. The revolution of this spindle communicates an undulatory motion to the diaphragms which propels forward any fluid contained in the case. A counter connected to the spindle or to the diaphragms registers the quantity of fluid which passes through.

DRYDEN, J. *Improvements in weaving.* Dated Nov. 29, 1856. (No. 2825.)

This consists of arrangements of parts to obtain a uniform and equable take-up motion for the woven cloth as it is produced by the weaving action.

JOHNSON, W. *Improvements in projectiles.* (A communication.) Dated Nov. 29, 1856. (No. 2826.)

This consists in the construction of expansion and extension wings for governing the direction of projectiles fired from a gun, and in applying spiral projections or grooves along the surface of projectiles to produce a rotation on their axis along with the projectile motion, and also in applying a case or collar thereto to be fired from a rifled gun.

STUART, L. C. *Improvements in machinery for reducing fibres to pulp.* (A communication.) Dated Nov. 29, 1856. (No. 2828.)

A cylinder is used, closed at each end,

and by preference of large diameter, as compared with its length. On the interior of the cylinder is a revolving disc nearly as large in diameter as the cylinder. The surfaces of the disc and of the interior of the cylinder are formed with grooves, cutters, or knives, or with teeth to aid in the grinding process. The disc receives a quick rotary motion, being fixed to a shaft or axis which passes through one end of the cylinder. The disc and its axis can move a small distance to and fro within the cylinder.

BROWN, J. *Improvements in the construction of the lower masts of ships.* Dated Nov. 29, 1856. (No. 2829.)

This invention was described at p. 566, of No. 1766.

CLARK, J. L. *Improvements in electric telegraphs.* (Partly a communication.) Dated Nov. 29, 1856. (No. 2831.)

This consists in a metod of insulating and supporting telegraph wires suspended in the air. Insulators of earthenware, glass, &c., are of the form of an inverted cup, and are made double; that is to say, there is a smaller cup contained concentrically within the exterior insulating cup, and springing from the interior thereof, so as to be protected by it. On the top of the exterior inverted cup is formed a notch for receiving the wire. It requires an engraving to illustrate the other arrangements.

HARMER, R. *Improvements in stereoscopic pictures.* Dated Nov. 29, 1856. (No. 2832.)

The patentee uses two pictures in the ordinary way, similar in outline but different in colour. One picture may be emerald green and carmine, and the other may be blue and violet, which colours, when viewed in the stereoscope, blend.

GEDGE, J. *Improvements in lubricating the journals of the axles of railway vehicles or other moving parts of machinery.* (A communication.) Dated Dec. 1, 1856. (No. 2836.)

This invention cannot be described without engravings.

GEDGE, J. *Improvements in gas meters.* (A communication.) Dated Dec. 1, 1856. (No. 2837.)

Here the water is kept upon the precise level required, and this is maintained by means of a reservoir which supplies water in exact proportion to the evaporation of that contained in the meter.

HADDAN, J. C. *Improvements in pianofortes.* Dated Dec. 1, 1856. (No. 2838.)

This consists in manufacturing of metal the framing or portion of pianofortes across which the strings are to be stretched, and also with the upper or wrest plank bridge cast in one piece, or combined therewith; and also in the use and application of such metal framing in combination with a wrest, flank, or bed, or bar of wood (for carrying the wrest or tuning pins); and also in manufacturing the upper or wrest plank bridge of pianofortes of metal with notches, grooves, or hollows, for guiding or maintaining the springs or wires in position. And the invention also consists in loading or weighting the bass strings of pianofortes with metallic or other buttons or discs, so as to obtain deep notes with shorter lengths of the strings than heretofore. And also in galvanising or tinning the strings of pianofortes so as to preserve the strings from oxidation.

GIBSON, J. *Improvements in buffing and drawing apparatus.* Dated Dec. 1, 1856. (No. 2839.)

This consists in constructing buffing and drawing apparatus with a combination of spiral, helical, or coil springs disposed at suitable distances from the axis or centre line of the buffer or draw bar, and at suitable distances from each other, instead of being placed upon the buffer or draw bar, or within each other, as ordinarily practised. Also in constructing buffing apparatus of two cylinders or cases, for buffing springs, with one part furnished with snugs, and the other with grooves or notches, so disposed that one of the cylinders may be placed in the other, the snugs passing through the grooves, and slightly turned round within the other part, and while holding them together allow of the necessary sliding movement.

COLLIER, G., and J. W. CROSLEY. *Improvements in apparatus used in hot pressing, and in the means of manufacturing parts of apparatus used for such purpose.* Dated Dec. 1, 1856. (No. 2840.)

These relate to press plates heated by steam, and consist—1. In forming such plates partly of cast and partly of wrought metal by casting the channels or passages in the cast part of each plate and rivetting thereon the plate of wrought metal, thereby covering the passages. 2. In forming such press plates by enclosing the steam pipes between plates of metal, and filling up the space between the coils of piping by iron, cement, &c., to prevent their collapsing under pressure. 3. In forming the pipes with joints, so that the same may admit of the required movements of such plates by the adaptation of union joints made light by the use of india rubber, &c. 4. In self-acting supports to the plates in the press when pressure is removed therefrom. 5. In forming the sand moulds for each of such plates by using a metal pattern supported from the joints of the mould box. 6. In supporting in such moulds the tubes to be enclosed in the casting by metal pins or studs aided by the screwing together of the parts of the mould box.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

SHARP, G., and W. ELDER. *Improvements in steam hammers and machinery for forging iron and other substances.* Dated Nov. 24, 1856. (No. 2790.)

This consists of improvements upon the ordinary helve or tilt hammer, in the combination and arrangement of its several parts, and in the application of a steam cylinder direct to the helve of the hammer, and by the improved arrangement of the valve motion the whole is rendered self-acting.

BOND, J. *Improvements in machinery for counting and indicating the number of revolutions performed by rollers and shafts.* Dated Nov. 25, 1856. (No. 2791.)

This consists of a worm on the axis of the roller or shaft gearing into a worm wheel, on the face of which is a scroll; this scroll gears into the teeth of a crown or toothed wheel, the face of which serves as the dial plate. The finger which indicates the number of revolutions on the dial plate is stationary, and may be fixed to the end of the stud or pin on which the dial plate revolves.

BROOMAN, R. A. *Improvements in machinery for embroidering.* (A communication.) Dated Nov. 25, 1856. (No. 2794.)

This consists of machinery in which the material to be embroidered is mounted in a frame free to move horizontally and vertically in guides when acted on by jacquard machinery, with which it is connected by levers or arms, and which is furnished with cards perforated according to the pattern or design to be embroidered. The embroidering is performed by needles pointed at both ends, and held by springs in carriers travelling on beds on each side of the material, and worked by cams and springs, or otherwise. These needles pass from the carriers on one side through the material to be embroidered to the carriers on the other side, and the threads are caught and drawn up, or along, or down, by means of combs or notched plates worked by counterbalance weights and levers, acted on by cams or by connexions from the jacquard or otherwise.

RIANT, L. G. *An improved mode of preparing whalebone, gutta percha, and other elastic bands employed in the manufacture of wearing apparel.* Dated Nov. 26, 1856. (No. 2801.)

The material employed for the bands is notched at equal distances on both sides, to give it an amount of elasticity unattainable in its ordinary state. It may be employed of any convenient thickness.

HENDERSON, M. *Improvements in cutting, sawing, or shaping and polishing stone.* Dated Nov. 26, 1856. (No. 2803.)

This relates to contrivances for actuating the ordinary smooth edged metal cutter used in cutting stone by hand. Under one modification the apparatus consists of a bed and frame resembling that of an engineer's planing machine. The stone to be cut is placed upon a moveable platform within this frame, beneath a horizontal saw frame carrying as many cutters as are necessary. This saw frame is suspended at each end upon a short crank arm, actuated by gearing, to revolve at a high rate. In this way the saws, which are always kept horizontal, are rapidly brought into, and taken out of, a short cut upon the stone beneath. Each time the saws leave their cut sand and water are employed. In polishing stone, the rough block is placed upon a revolving table, carried upon the upper end of a vertical spindle driven from beneath, and the polishing block of stone or metal is held down by an overhead frame, so as to press upon the upper surface of the revolving stone.

GILBEE. W. A. *An improved mode of reefing and reducing top sails.* (A communication.) Dated Nov. 27, 1856. (No. 2809.)

The inventor makes four eyelet holes in the reef, the first two being about 2 feet from the centre of the sail on either side, the outer holes being about 4 feet from the centre. The lines reef from aft forward, having knots on the ends of the lines, bringing the knots close to the holes. The lines then run up between the head of the sail on a straight line and the fore part of the yard, thence to the mast head direct, with a block at the mast head reefing from forward aft, and thence leading on deck, or into the top; so continue with as many lines as may be necessary according to the size of the top sail.

HODGE, P. R. *Improvements in the manufacture of felted cloth.* Dated Nov. 27, 1856. (No. 2811.)

In manufacturing felted cloth the inventor uses a weft bat or sliver. When he uses a weft bat he makes it of a few slivers thick, brings it on a roller to the open space between the last doffer of the card and the travelling apron, and places it on a frame above the said space, and causes the bat so to travel from side to side, and be cut with shears, as to make a series of slabs of felt to lay exactly parallel close to each other, and be in the centre of the warp or longitudinal bat. He also, by machinery, causes a narrow sliver to travel across this open space from side to side, and cuts the same into slabs, and causes them to lay parallel to each other, and alternately over each progressive longitudinal sliver.

ALLEN, M. *Improvements in the slide valves of steam engines.* Dated Nov. 18, 1856. (No. 2822.)

A slide valve which moves over the steam exhaust parts is similarly constructed to those ordinarily used, but it has an opening through it to receive a tube which is fixed to a sliding plate, these and other parts being so arranged as to place the back and front of the valve under the same pressure or exhaust.

WRIGHT, L. W. *Improvements in machinery for bending plates for the formation of pipes and tubes.* Dated Nov. 29, 1856. (No. 2827.)

This consists in arrangements of levers and pressers driven or guided by cams so as to press the plate from which the tube is to be formed over and around a mandril supported in suitable frames.

ATKINSON, E. S. *An apparatus for condensing vapours, fumes, gases, and smoke arising from chemical and smelt works.* Dated Nov. 29, 1856. (No. 2830.)

The inventor uses an apparatus with one or more rotating fans in connection with a cistern or condenser, in which he fixes perforated or false floors, one above the other. Each and all of the floors are fixed above the pipe which is in connection with the fan, or above where the pipe of the fan enters the cistern. Into this cistern he pours water, (or else a solution of sulphuric, or other cheap acid), until the topmast floor is covered over. When the apparatus is placed in connection with the furnace to which it is to be applied, and motion imparted to the fan or fans, the fumes, &c., are collected from the flues and inducted into and below the surface of the liquid in the cistern, whilst the perforated floors divide and distribute the fumes, &c., as they rise to the surface.

WORTHINGTON, J. *Improvements in telegraphing and communicating on railway trains.* Dated Dec. 1, 1856. (No. 2833.)

This consists in fitting to the engine or carriages a series of tubes made to slide readily one within the other. At one end of the tube is fitted a lamp, and at the opposite end on the engine is placed a looking-glass. When the attention of the engine driver or guard is to be called, the lamp is placed at one end of the tube and the light reflected on the glass, or a bell may be rung, and the tube used for speaking to convey verbal communications from the guard to the driver, or *vice versâ.*

GILKS, C. H. *An improved stand for umbrellas for railway and other carriages.* Dated Dec. 1, 1856. (No. 2834.)

To the door of the vehicle the inventor applies two studs, and a stand is slotted so as to fit on to these studs. The sides of the stand are bevelled off, and the stand is perforated at the bottom, and communicates with an outlet from the carriage for the drippings from the umbrellas.

JONES, J. C. *The improvement of the common pin wooden leg and crutch.* Dated Dec. 1, 1856. (No. 2835.)

The object here is to construct the bottom, or pin part of the common wooden leg and crutch, so as to prevent friction. The object is effected principally by the use of metal joints, and vulcanised india-rubber between the metal joints and leather soles.

BARDOT, H. N. D. *Improvements in treating or preparing colours for printing.* Dated Dec. 1, 1856. (No. 2845.)

This consists in the use of new compounds intended to thicken the colours. The inventor uses decoctions of lichen, pearl moss, alga fucus, sea weed, and generally of all mucous plants. These decoctions being made, he adds to them either alums, silicates, or borates, &c.

DWYER, E. *Improvements in the manufacture of children's chairs.* Dated Dec. 2, 1856. (No. 2847.)

A chair is made of the usual form, having a flap shutting down with a spring. The inventor arranges a second chair to combine with it in a certain way.

CORNWALL, F. *Certain improvements in the construction of fire-places applicable for general purposes, whereby combustion is rendered more perfect and capable of regulation or control, smoke thoroughly consumed, and the draught in open fire-places much increased.* Dated Dec. 2, 1856. (No. 2848.)

This consists in constructing open fire-places, so that a strong current of air may be induced direct through the fire, escaping through vertical or horizontal slots or openings in the back, and conducted to the chimney by an auxiliary flue, and which flue may be kept under regulation by valves.

PROVISIONAL PROTECTIONS.

Dated June 24, 1857.

1758. Hamilton Henry Fulton and Thomas Bodley Etty, of Great Queen-street, Westminster. Increasing the traction and bearing surface of carriage wheels.

Dated June 25, 1857.

1784. Joseph Arthington, brass-founder, and Henry Smith, brass-finisher, of Huddersfield. Improvements for the better illumination of the Davy lamp.

Dated July 2, 1857.

1852. Jean Baptiste Meeus, of Arlon, Belgium. Improved method of multiplying motive power, and transmitting it to a shaft or other mechanism.

Dated July 3, 1857.

1854. Matthew Clark, of Alexandria, Dumbarton, calico-printer. Improvements in the preparation of cloth for Turkey-red dyeing.

1856. Charles Topham, of Hoxton, engineer. An improved apparatus for raising and forcing liquids.

1858. John Fordred, of Stoke Newington, gen-

tleman. Improvements in treating and purifying water.

1860. John Edmund Gardner, of 453, Strand, lamp-manufacturer. Improvements in illuminated clocks, and in apparatus employed for lighting the same.

1862. John and William Agar, of Bury, Lancaster, watch-manufacturers. Improvements in watches and keys for the same.

Dated July 4, 1857.

1864. Robert Gibson, Joseph Gascoigne, and Samuel Gibson, all of Hunslet, engineers. Improvements in boilers for generating steam.

1866. Michael Henry, of Fleet-street. An improved machine for cleaning and crushing grain. A communication from Messrs. Ouin and Dugué.

1868. John Grantham and Henry Sharp, of Liverpool, engineers. Improvements in working the valves of steam engines.

Dated July 6, 1857.

1872. William Munt, of Charterhouse-lane, Smithfield. A shank to be attached to all descriptions of buttons, to be called an eylot shank.

Dated July 7, 1857.

1874. Charles and David Faulkner, of Birmingham, gun-barrel makers. Improvements in gun and pistol barrels, and in cannons, and in furnaces for the same.

1876. William Dawes, of Wellington, Salop, engineer. Improvements in the pistons of steam engines.

1878. Richard John Badge, of Newton-heath, near Manchester, store-keeper. Improvements in railway chairs.

1880. Frederick Bousfield, of Hereford-terrace, De Beauvoir-town, gentleman. Improvements in the manufacture of soap.

1882. Peter Armand Lecomte de Fontainemoreau, of Paris. Certain improvements in apparatus for the manufacture of boots and shoes, which apparatus is also applicable for uniting other articles together. A communication.

1884. Peter Hippolyte Gustave Bérard, of Rue St. Denis, Paris. Improvements in manufacturing and applying concentrated collodion.

1886. William Smith, of Kettering, Northampton, agricultural implement manufacturer. Improvements in horse hoes and drills.

1888. Richard Archibald Brooman, of 166, Fleet-street, London, E. C., editor of the *Mechanics' Magazine* and patent-agent. Improvements in vices.

1890. Richard Archibald Brooman, of 166, Fleet-street, London, E. C., editor of the *Mechanics' Magazine* and patent-agent. Improvements in connecting carriages and wagons on railways. A communication from Monsieur Mouret.

Dated July 8, 1857.

1892. William Edmondson Jones, of Glades Spring, Virginia, U. S. An improvement in trees of riding saddles.

1894. George Green, of Whitehorse-lane, Mile End-road. Improvements in machinery for the manufacture of casks, barrels, and other similar articles.

1896. Jules Joseph Henri Brianchon, of Paris. Improvements in colouring and ornamenting glass, porcelain, earthenware, and other ceramic substances.

1898. Hilary Nicholas Nissen, of Mark-lane, stationer. An improved method of making impressions similar to water-marks upon paper.

1900. Louis Albert Bahn, of Greek-street, Soho, gentleman. Improvements in the manufacture and application of certain metallic alloys.

1902. Nicholas Marshall Cummins, of Annmount, Cork, Esquire. Improved means for indicating the proximity of icebergs. A communication from Lieut.-Col. J. S. Cummins, of Robinson, Canada.

Dated July 9, 1857.

1904. Arthur Dobson, of Belfast, bleacher and finisher. Improvements in machinery or apparatus to be used in bleaching, washing, starching, airing, and finishing fabrics, and in sizeing yarns.

1906. John Holley Swan, engineer, of Glasgow. Improved machinery and steam engine for crushing quartz and other hard substances, and for amalgamating.

1908. John Julius Cléro de Clerville, of Newman-street. Improvements in the manufacture of oil-cloth and imitation leather. A communication from F. Abate, of Paris.

1910. Richard Archibald Brooman, of 166, Fleet-street, London, E. C., editor of the *Mechanics' Magazine* and patent-agent. An improvement in propelling ships' boats and other vessels. A communication.

1912. William Mann, engineer of the City of London Gas Works. An improved arrangement of steam boiler gauge cocks, and registering apparatus connected therewith.

1914. Thomas Lewis, of Birmingham, mining engineer, Henry Parrish, of the same place, gentleman, and Robert Martin Roberts, of Dolgelly, Merioneth, mining captain. Improvements in the separation and extraction of copper from its ores.

Dated July 10, 1857.

1916. Eastwood Eastwood, of Burnley, Lancaster, mechanic. Improvements in picker bands for looms.

1918. Thomas Vicars, sen., Thomas Vicars, jun., and Thomas Ashmore, of Liverpool, engineers, and James Smith, of the same place, baker. Improvements in the manufacture of bread, biscuits, and like articles, and in the machinery connected therewith.

1920. David Hope, of Bishops Auckland, Durham, engineer. An improved method of preventing one train from running into another on railways.

1922. Richard Archibald Brooman, of 166, Fleet-street, London, E. C., editor of the *Mechanics' Magazine* and patent-agent. A method of and apparatuses for scouring or extracting oil and grease from wools and woollen fabrics, and for extracting gum and gummy matter from silk. A communication.

1924. William Edward Newton, of Chancery-lane. Improvements in the construction of furnaces and steam boilers. A communication from L. I. Molinos and C. Pronnier, of Paris.

1926. William Smith, of Little Woolstone, near Fenny Stratford, farmer. Improvements in steam engines for giving motion to agricultural implements.

1928. George Dyson and Thomas Harrison, of Tudhoe Iron Works, near Ferry-hill, Durham. An improvement or improvements in steam engines.

1930. John Chanter and David Annan, of Bow. Improvements in furnaces when moveable bars are used.

Dated July 11, 1857.

1937. Bernard Denizot, civil engineer, and Charles Flipps, gentleman, of Paris. An improvement in the construction of railway breaks.

Dated July 14, 1857.

1955. James Webster, of Birmingham, engineer. An improvement or improvements in safety-valves.

1957. Jeffries Kingsley, of Bedford-square, lieutenant. Obtaining or applying a primary motive power, namely, the water of a river, which causes a vacuum in an exhausting receiver, which may be transferred by tubes to other machines, causing water and ores to be raised from mines, likewise

causing the steam engine to be superseded, water being cheaper than coals.

1959. Gustavus Palmer Harding, of Jewin-street, manufacturer. Improvements in the manufacture of hats, caps, and other coverings for the head.

1961. Thomas Mosdell Smith, of Hammersmith. Improvements in the preparation of materials applicable to the manufacture of candles.

Dated July 15, 1857.

1963. François Moulin, of Lyons, mechanician. A new improved railway brake.

1965. John Henry Quick, of Pimlico, hat-manufacturer. An improved hat.

1967. Richard Archibald Brooman, of 166, Fleet-street, London, E. C., editor of the *Mechanics' Magazine* and patent-agent. Improvements in the manufacture of hats, bonnets, and other coverings for the head. A communication from Monsieur Laporte.

1969. John Henry Johnson, of Lincoln's-inn-fields. Improvements in machinery or apparatus for marking or imprinting characters on paper and other fabrics. A communication from S. W. Francis, of New York.

1971. John Henry Johnson, of Lincoln's-inn-fields. Improvements in sewing-machines. A communication from J. E. A. Gibbs, of Virginia, U. S.

Dated July 16, 1857.

1973. James Wright, of Alfred-place, Newington-causeway, civil engineer. Improvements in the manufacture of gas.

1975. William Armand Gilbee, of South-street, Finsbury. Improvements in the treatment of fatty matters for the manufacture of candles and night-lights. A communication.

1977. George Samuel Mathews, of Wardour-street, gentleman. Improvements in railway breaks.

Dated July 17, 1857.

1979. John Avery, of Essex-street, Strand. Improvements in steam engines. A communication from T. Maskell, of Franklin, U S.

1981. Joseph Russell, of Woodlands-road, Blackheath, gentleman; Henry William Spratt, of Granville-park, Lewisham, architect; and William Press, of Stepney-causeway, Commercial-road East, engineer. A certain new method or methods, or new improvement or improvements, in the construction, application, and use of machinery for propelling boats, ships, or vessels of any class or denomination.

1983. Thomas Foxall Griffiths, of Birmingham, manufacturer. An improvement or improvements in shaping metals.

1985. Thomas Clunes, of Aberdeen, plumber, and John Macintosh, of the same place, engineer. Improvements in machinery or apparatus for bottling or supplying vessels with fluids.

1987. Samuel Ramsden, of Hunslet, near Leeds, engine smith. Improvements in the construction and fixing of window-sashes.

Dated July 18, 1857.

1989. Augustus Dacre Lacy, of Knayton, York, gentleman, and William Collett Homersham, of Adelphi-terrace, civil engineer. Improvements in machinery for ploughing and cultivating land by steam or other suitable motive power.

1993. William Edward Newton, of Chancery-lane. Improved machinery for cutting metals or other hard substances. A communication.

Dated July 20, 1857.

1997. George John Newbery, of Straitsmouth, Greenwich, artist. Improvements in window-blinds.

2001. Thomas Restell, of New Kent-road, engineer. Improvements in breech-loading fire-arms, and in fastening the barrels of fire-arms to their stocks.

2003. William Edward Newton, of Chancery-lane, civil engineer. Improvements in reaping and mowing-machines. A communication.

2005. Henry Vennor Cowham, of Skeffling, York. Improvements in machinery for breaking or pulverising land.

2007. Samuel Butler, of Nottingham, lace-manufacturer. Improvements in the manufacture of ornamental bobbin, net, or twist lace.

Dated July 21, 1857.

2009. George Parsons, of Martock, Somerset, agricultural-implement maker. Improvements in thrashing machines known as combined thrashing-machines.

2011. Andrew Scott, of Charlotte-terrace, Islington. Improvements in stops for gates and doors.

2013. Josef Mohr, of Vienna, cotton-manufacturer. Improved machinery for propelling vessels.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

2023. Jean Jacques Bouvert, civil engineer, and François Isidore Jean Pascal, solicitor, of Paris. Improvements in smoke-preventing apparatus. Dated July 23, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," August 4th,* 1857.)

774. M. A. C. Mellier. Improvements in desiccating or drying paper and other goods in process of manufacture.

796. S. Hemming. A new or improved material for roofing or other building purposes.

825. T. Lawes. An improved construction of agricultural implement to be used in tilling the land.

827. W. H. Collins. Improvements in attaching knobs to spindles.

828. T. Lawes. A machine or apparatus to be used in cleansing, purifying, and drying animal and vegetable substances.

831. J. Hewett. Improvements in sewing-machines. A communication.

832. P. Hill. Improvements in machinery for stamping, marking, or printing and arranging, papers, letters, and other articles.

834. R. Sims. Improvements in machinery or apparatus for cutting hay, straw, and other similar substances.

841. J. W. Wilson. Improvements in the cutting tools used for rounding, surfacing, or otherwise operating on wood.

843. U. Lane. An improvement in the transmission of motive power.

851. J. J. Palmer. Improvements in the construction of steam boilers.

852. J. Morris. Certain improvements in connecting the rails of railways.

855. E. von Löwenstein. Improvements in the construction of ovens for the manufacture of coke.

864. D. Thomson. Improvements in rotary pumps.

869. H. B. Girard. Improvements in insulating telegraphic wires or conductors, and in apparatus for stretching such wires.

873. A. Neild and N. B. Sutcliffe. Improvements in treating or cleansing certain descriptions of cotton waste.

890. J. Wright. An improved method of bleaching straw plait and straw. A communication.

891. J. Graham. An improved steering-apparatus.

912. F. A. Laurecisque. An improved system of constructing dissected maps or charts.

917. E. Maw. An improvement in the construction of the points of railway crossings.

948. J. H Johnson. Improvements in the manufacture of hard india-rubber. A communication.

967. J. H. Taylor. Improvements in regulating the flow of fluids.

976. J. Robinson. An improved apparatus for driving or giving motion to power looms, which said improvement is also applicable to driving other machinery.

993. A. V. Newton. Improved machinery for manufacturing coiled springs. A communication.

1079. W. E. Newton. Improvements in the construction of boats, buoys, floats, or other buoyant vessels. A communication.

1086. A. L. de Fontainemoreau. An improved truck apparatus for moving and transporting stones and other heavy bodies. A communication.

1151. G. Wright. Improved apparatus for heating.

1161. M. Smith. Certain improvements in looms for weaving.

1262. E. Davis. An improved construction of pressure gauge.

1269. W. B. Paul. Improvements in signalling upon railways.

1337. T. Lambert. Improvements in apparatus for drawing off water and other fluids.

1394. R. Bodmer. Improvements in locomotive steam engines. A communication.

1405. J. F. P. L. Von Sparre. Improvements in separating substances of different specific gravities, and in the machinery and apparatuses employed therein.

1474. R. A. Brooman. Improvements in pumps. A communication.

1494. J. Savory. A machine for separating seeds, whitecoats, and dirt from wheat and seeds, awns and dirt from barley, and for cleaning and polishing wheat, barley, and other grain, fit for market.

1518. C. Fleet. An improvement or improvements in the manufacture of printing-ink. A communication.

1684. J. Fowler, jun., R. Burton, and T. Clarke. Improvements in the construction and arrangement of locomotive and other carriages to facilitate their movement on common roads and other surfaces.

1816. G. Swindells and J. Arnold. Certain improvements in spinning and doubling yarns, and in machinery or apparatus of the kind commonly known as mules and twining jennies.

1822. G. A. Buchholz. Improved machinery for hulling and cleaning rice, wheat, and other grain.

1832. T. Brewer. Improvements in machines for cutting and reducing turnips or other vegetable substances.

1854. M. Clark. Improvements in the preparation of cloth for Turkey-red dyeing.

1872. W. Munt. A shank to be attached to all descriptions of buttons, to be called an eylot shank.

1894. G. Green. Improvements in machinery for the manufacture of casks, barrels, and other similar articles.

1909. J. S. Russell. Improvements in apparatus and slips for moving ships and vessels out of and into the water.

1927. W. Woodman. Improvements in railroad wheels. A communication.

1953. F. C. Calvert and C. Lowe. Improvements in the manufacture of size.

1985. T. Clunes and J. Macintosh. Improvements in machinery or apparatus for bottling or supplying vessels with liquids.

1989. A. D Lacy and W. C. Homersham. Improvements in machinery for ploughing and cultivating land by steam or other suitable motive power.

1993. W. E. Newton. Improved machinery for cutting metals or other hard substances. A communication.

2007. S. Butler. Improvements in the manufacture of ornamental bobbin, net, or twist lace.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1665. Richard Johnson.
1681. Henry Walduck.
1686. Joseph Green and William Jackson.
1708. Edward Hallen.
1709. Louis Player Miles.
1787. William Kennard.
1847. William Edward Newton.

LIST OF SEALED PATENTS.

Sealed July 31, 1857.

289. William Hargreaves.
294. Daniel Howorth.
297. William Henry Holding and James Robert Casbay.
309. Florentin Garand.
339. William Green.
356. William Greenslade and James Wood.
394. Thomas Howard.
397. John Talbot Pitman.
407. Joshua Horton, jun.
414. Isaac Blackburn and Robert Blackburn.
447. William Robinson Jackson.
465. Jean Baptiste Pascal.
644. William Holland.
751. Modeste Anquetin.
923. William Henry Box.
1030. Thomas Robert Winder.
1101. Henry Heald.
1118. William Crighton and Peter Foxcroft.
1248. Peter Fairbairn and Thomas Marsden.
1260. Jules Alexandre Petiet.
1302. Caleb Tayler.
1303. Charles Edward Darby.
1316. Henry Hobbs and Edward Easton.
1327. Alfred Vincent Newton.
1397. William Edward Newton.

Sealed August 4, 1857.

57. Charles Frederick Claus.
338. Henry Myers, Charles Askew, and John Askew.
351. Charles Crickmay.
355. Joseph Skertchly.
378. Abel Stokes.
429. Noel Clayton Smith.
431. John Lawson and Stephen Cotton.
433. Richard Houchin, jun.
467. Frederick Burnett Houghton.
540. Joseph Robinson.
704. William Makin.
749. William Edward Newton.
807. Henry Dolby and Edwin Thomas Dolby.
911. George Lowry.
1156. John Thomas Way.
1357. George Woodward Morse.
1533. Ferdinand Charles Warlich.
1617. Thomas Hale.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

Flying Visitor.—We are much obliged to you for your courtesy. Your enclosures came too late for this week, but we shall avail ourselves of them in our next number.

Nauticus.—Your letter has afforded us genuine pleasure, and we sincerely thank you for it. We can only regret that we are compelled to dissent from your opinions on the specific subject mentioned. If you held our office you would find occasional sharp-speaking absolutely necessary. For every man of sound sense and gentlemanly address we have, we hope, unmeasured respect. We shall always receive your communications with much pleasure.

Robert Armstrong, Limehouse.—We really cannot insert your letter upon "The Power of the Steam Engine." We could only do so upon the assumption that our readers have either very much more or very much less sense than ourselves, and we are loath to believe anything so painful. Many of your statements are altogether unintelligible to us, and must be either very learned or very wrong. You start by saying that the generally received definition of "power" is "the product of force and space passed over;" and you proceed to say that the present rule assumes "that a weight or pressure is equivalent to lift an equal weight at any velocity," and that "the power of a weight, or pressure of steam through any amount of space in the same time is correctly represented by that weight or pressure at rest; or, in other words, the power of the steam engine is the pressure on the piston and the time." You say many other equally mysterious things. Now, we positively do not understand such statements. They are not the language of science, and therefore, however correct your meaning may be, your letter fails to convey it. You may have the MS. back; perhaps you may find a contemporary who will consider it a very able and valuable production.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburg.

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Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

PENNY AND BOOTH'S PATENT MACHINERY FOR WASHING, CLEANSING, AND DRYING GRAIN.

Fig. 2.

Fig. 1.

PENNY AND BOOTH'S PATENT MACHINERY FOR WASHING, CLEANSING, AND DRYING GRAIN.

Messrs. Penny and Booth, corn-millers, of Heckmondwike, York, have patented an improved apparatus in which the whole of the several operations of washing, cleansing, and drying grain may be performed.

The improved machinery is arranged as follows; — First, as regards that portion of the improved apparatus which is to be employed in and for the operation of washing grain. It consists of an iron cylinder, upon the inside of which is fixed a number of iron spikes, against which the wheat or other grain to be washed is worked by revolving brushes suitably placed in the cylinder, which is filled with water. After the grain has been worked by the above means a sufficient length of time to cleanse the same, it is discharged into a sifter, or any other convenient medium of conveyance, placed at another part of the apparatus, to which suitable motion is imparted; from thence the grain passes into another part of the apparatus, where it undergoes the operation of drying, which may be effected by imparting a very high speed or velocity to the vessel into which the grain passes to be dried. All the above operations are performed simultaneously, the feeding and discharging continuing while the machine is in motion.

Fig. 1 is a sectional elevation of the improved machine, as adapted for drying grain; fig. 2, an outside elevation of the drying machine, with a washing machine or arrangement adapted thereto for washing grain; fig. 3, a bird's-eye view of part of drying machine. A, fig. 1, is the main driving shaft of drying machine, made of wrought iron, turned true and parallel, and adapted to receive a driving pulley which may be fixed upon the said shaft, either above or under the machine; B, a cylinder, the bottom of which consists of curved arms, *a a*, attached by a dome or conical-shaped boss to another boss, *b*, where it is keyed fast on the shaft, A. The outer or upright rim of the aforesaid cylinder consists of a number of pillars with collars, *c c*, formed thereon, thus forming an open or skeleton cylinder, to which is affixed a plate perforated with innumerable small holes. At the top of the aforesaid cylinder there is a flat horizontal rim, C, to which is attached a perpendicular rim of metal, D, ascending from a flat rim, *d*. The aforesaid cylinder and rims should be turned perfectly true, and the whole securely and firmly keyed on the shaft, A. E is a metal plate fitted accurately within the cylinder, B, and adapted to slide up and down the same from top to bottom thereof, and *vice versâ;* this plate is perforated with faucet holes, and is attached by a dome or conical-shaped boss to the sliding boss, D, by bolts passed through the broad flange in the boss; this last-mentioned boss, as also the plate, E, are connected to the vibrating lever, H, by links, I; the said lever is raised by means of the rack, K, and wheel and pinion, L and M, motion being imparted thereto by the winch handle, N, until the lever arrives at the position denoted by the dotted lines, at which point the plate, E, will have been raised from the bottom to the top of the cylinder. O is a cover for the cylinder, formed in six compartments, as exhibited at fig. 3; each compartment is covered with strong wire gauze, and the cover is attached to the sliding boss, D, on the flat rim, *d*, by pillars and bolts, *e e*. P is an outer case or tub, made of cast metal, in which the cylinder, B, is enclosed; Q is an outer flange, formed in six compartments, which are connected together and to the case or tub, P, by bolts; one compartment has the outer rim thereof removed for discharging the contents of the cylinder, as denoted at 1 and 2 in fig. 3. R is the framework of the machine, supporting the main driving shaft, A, case or tub, P, lever, H, &c., &c., thus rendering the machine portable; there is a pedestal at bottom of the machine for the neck of the shaft to work in, and a flat plate of brass, S, under the foot of the shaft, A, for supporting same, this plate being placed in a box containing oil, and there is a brass bush set by four screws, *f*, for supporting the top of the shaft in proper working position. T is the middle neck of the shaft, A, fixed in the dome in the centre of the case or tub, P; and *g g* are three wedges of hard wood, each pressed to its position by a set screw, *h*. At fig. 3, U U are two additional feet attached to the case, P, serving as stays to the machine whilst in motion.

We now come to that part of the improved machinery which is employed for effecting the washing of grain. At fig. 2, V is a vessel formed of any material suitable for containing water; W, a shaft on which are fixed arms or agitators, *i i*, as also a sweeper, *k; x* is a perforated plate, forming the bottom of the vessel, V, through which the dirty water passes after washing the grain, the said water being conveyed away by a pipe, *l*, furnished with a valve, for retaining the water in the machine as long as is needful; *m* is a pipe and tap for supplying water to the machine. The patentees have found it desirable in practice to line the washing cylinder with wire gauze, placed between the beaters and the outside, and into the space under the false bottom, as at *x'*, where the dirty water is collected and carried away. They also employ pieces of iron (not shown) projecting from

the cylinder through the wire gauze, for the beaters to break the dirt against, as also to prevent the grain from circulating with the motion of the beaters. Y is a spout for conveying the grain into the machine, and Z is a valve and spout for discharging the grain therefrom when washed; the wet grain falls directly into the drying machine, where it is received upon the plate, *d*, and from thence is spread by centrifugal force against the outer rim or surface of the cylinder, B, and by the same force the water is thrown out of the grain through the perforated plate. After the grain has been subjected for a sufficient length of time to this operation, the plate, E, boss, *b*, and cover, O, are then raised by the lever, H, as before stated, by which the grain will be thrown with great force over the rim and against the flange, and is finally discharged through the open side of the flange by a sweeper (not shown in the engravings), which may be adapted according to circumstances. The speed at which the driving machine should work may vary from two hundred revolutions and upwards per minute.

THE CIRCUMLOCUTION OFFICE.

In his last novel, "Little Dorrit," Mr. Charles Dickens introduced, as every one knows, an account of an office denominated the Circumlocution Office, and said to be "the most important Department under Government." Numerous persons have read that account with considerable displeasure, and several writers for the periodical press have fallen foul of him on account of it. Among these is the Editor of the *Edinburgh Review*, himself a Government officer. This gentleman not only defends the Government against the assault of Mr. Dickens, but triumphantly mentions the career of Mr. Rowland Hill as a well-known exemplification of the encouragement afforded to able and progressive men by the Government, and charges Mr. Dickens with availing himself loosely and unfairly of passing events in order to impart interest to his works of fiction, alleging that "even the catastrophe in 'Little Dorrit' is evidently borrowed from the recent fall of houses in Tottenham-court-road, which happened to have appeared in the newspapers at a convenient period." Upon this article in the *Edinburgh Review* Mr. Dickens has published a few remarks in his *Household Words*, restricting his attention chiefly to the case of Mr. Rowland Hill, and the Tottenham-court-road statement. After describing his view of Mr. Rowland Hill's labours and successes in postal improvements, he says:

"If the *Edinburgh Review* could seriously want to know 'how Mr. Dickens accounts for the career of Mr. Rowland Hill,' Mr. Dickens would account for it by his being a Birmingham man of such imperturbable steadiness and strength of purpose, that the Circumlocution Office, by its utmost endeavours, very freely tried, could not weaken his determination, sharpen his razor, or break his heart. By his being a man in whose behalf the public gallantry was roused, and the public spirit awakened. By his having a project, in its nature so plainly and directly tending to the immediate benefit of every man, woman, and child in the State, that the Circumlocution Office could not blind them, though it could for a time cripple it. By his having thus, from the first to the last, made his way in spite of the Circumlocution Office, and dead against it as his natural enemy."

In reference to the Tottenham-court-road case, he says:

"Any man accustomed to the critical examination of a book cannot fail, attentively turning over the pages of 'Little Dorrit,' to observe that that catastrophe is carefully prepared for from the very first presentation of the old house in the story; that when Rigaud, the man who is crushed by the fall of the house, first enters it (hundreds of pages before the end) he is beset by a mysterious fear and shuddering; that the rotten and crazy state of the house is laboriously kept before the reader whenever the house is shown; that the way to the demolition of the man and the house together is paved all through the book."

It is not our present purpose to add to the remarks of either the *Edinburgh Review* or Mr. Dickens upon the two foregoing cases; it is our intention to suggest a few considerations based upon a knowledge of facts which an Edinburgh reviewer is not likely to know, and which a reforming novelist is not likely to make public.

Mr. Dickens, in "Little Dorrit," describes the Circumlocution Office in terms of unmistakeable and intentional exaggeration. If such an office as he depicts existed, the public services would be at an end. If "no public business of any kind could possibly be done at any time without the acquiescence of the Circumlocution Office," and the exclusive perception of the Circumlocution Office in reference to everything which required to be done, was "how not to do it," and the Circumlocution Office "went on mechanically, every day, keeping this wonderful, all-sufficient wheel of statesmanship, How not to do it, in motion," then clearly nothing whatever of government business could, by any possibility, be accomplished, and the most strenuous Barnacle in creation would find himself quite unable to stick to any post. Mr. Dickens himself, in the preface to his work, mentions the Barnacles and the Circumlocution Office as an exaggerated fiction. It is, and it always has been, the habit of Mr. Dickens

to ruin, or seek to ruin, evil institutions and evil practices by the means here employed. His aim appears to be to make a thing that is hateful appear ridiculous, and then to consume it with contempt. And the public judgment has pronounced his method good and efficacious, and is too grateful for his past services to desire him to abandon it. It is, however, a method which requires much skill and much care in its application to the demolition of our great state evils; for in dealing with these the writer has to surmount, not merely the clinging instincts of the paid servants of the State, but also that strange, sensitive, conservative element which lies more or less latent in the breasts of Englishmen of all degrees, and which often reacts with astonishing effect against the most hopeful efforts of reformers. Still, in criticising Mr. Dickens's novel, it would be unfair to sink the fact that he is professedly warring not with a race of actual Barnacles, against the existence of an actual Circumlocution Office, but with a race of shallow, selfish, grasping, exclusive, haughty, obstructive, repulsive officials, and against a system which puts into perpetual practice the baneful spirit which pervades that race. Whether he is justified in assuming that such a race and such a spirit exist, is a question at which we shall glance hereafter.

The Daniel Doyce of "Little Dorrit" is a person who "has been too much accustomed to combine what was original and daring in conception with what was patient and minute in execution, to be by any means an ordinary man." He is an industrious, skilful, inventive mechanic, who wishes to gain distinction in his own country, and do whatever service he can do there, and accordingly returns from St. Petersburgh, at which place he has succeeded better than elsewhere. But Doyce is no man of business, and, on attempting to bring his inventions into use under the government, finds himself altogether beaten by the delay, the neglect, the routine, and the circumlocution of the Barnacles, and made to feel more like a criminal than a patriot. He subsequently goes abroad again, and becomes medalled, and ribboned, and starred and crossed like a born nobleman. The aim of the author in depicting a man of this description in his novel is apparent.

Now it is to be observed, that the contrast of the facilities afforded to inventors by an autocratic government with the obstructions which they meet with under a government like ours, depends upon the circumstances of the governments as well as upon the relative qualities of official persons. The Emperor of France, who is at the head of his own army, and navy, and civil service, and who is responsible to no one, has every inducement to have examined, and perfect liberty to adopt, any invention that may be submitted to him; but it is not so in this country, where every minister and every executive officer is responsible for his acts. What inducement, beyond simple patriotism, has the head of one of our public departments to facilitate the introduction of a novel invention, when he knows perfectly well that while, if the invention succeed, the inventor will reap all the advantage, if it fail, he himself is liable to incur the full amount of blame that follows? Of course it is highly desirable to change the existing state of things, if possible; but it is manifestly unfair to expect, under present circumstances, the same patronage for inventors from the officers of our Government as is accorded them by the rulers of autocratic states. There are many disadvantages attendant upon constitutional government; and this appears to be one of them. At the same time a practical remedy for some of the worst of the evils under consideration might probably be found, and the discovery of it would certainly be an immense service to the State. For the magnitude of these evils is very great. Heaven knows it is a dismal task for an inventor now to force even the most valuable invention forward in some departments of the public service. It is indeed too often a contest of skill with stupidity, of wit with dulness, of fiery patriotism with the most sluggish and foolish routine.

Yet, on the other hand, it must be acknowledged that the extravagance and ignorance of some inventors is fearfully great, and have to be resisted with the utmost stubbornness. As a class inventors are—as a very extensive acquaintance with them has convinced us—among the best and most intelligent of men. They are men of strong sense, extensive knowledge, and clear, definite purpose. But there is a section of them possessed of none of these characteristics; men who invent and re-invent useless, impracticable, and paradoxical schemes. And generally these men are infinitely more troublesome and pretentious than any others; and we do not wonder that they meet with but little encouragement from Ordnance Committees and Boards of Admiralty. There are scores of men who think bitterly, and speak loudly, and write fiercely about the routine of the Government, who would do the same about the most perfect government in the world. Their own stupidity and rudeness are the true sources of their complaints. The Barnacles and the Circumlocution Office are now, of course, in their mouths continually, although Mr. Dickens has, we should think, no pleasure in the patronage of his creations by such men.

It should further be known that, while immense advantages are annually furnished to this nation by those numerous patentees and other inventors who are continually improving our manufactures and commerce, many of the inventions which are submitted to the Government departments are the production of amateurs, who possess but an imperfect knowledge of the requirements of the several services, and these productions are consequently such as cannot be adopted in practice. As a proof of this we may state the following fact: During the progress of the Crimean War, many hundreds of inventions, several of them represented to be of the first importance, were submitted to the Government for their consideration, by men who, like Daniel Doyce, were unknown to the Government as practical men. The whole of that portion of these inventions which came to one of the chief departments was, we know, entrusted for examination to a person to whom the inventors were unknown, and who was instructed to report faithfully upon the inventions before him, to base his decisions upon scientific grounds alone, and to set forth scientific reasons for the opinions expressed in his reports. Now the result of his investigations was, not that a considerable proportion only of the inventions submitted to him were defective in detail—which would not have been surprising—but that, with two or three exceptions, all were fundamentally bad, and each of them quite incapable of fulfilling some one or more of the primary conditions which were essential to its adoption. Such a fact as this must not be passed lightly over. At the same time, it must not be supposed that that particular department spoken of received no aid from inventors. On the contrary, it was continually strengthened and assisted by the inventive resources of private contractors and others, who knew both how to contrive much that was needed and how to secure the adoption of their improvements.

It must not, however, as we have intimated, be thought that we consider beneficial changes in the relations of the public offices to inventors either impossible or undesirable. What is required is some measure or measures which will insure fairer play for sound inventions without lending additional countenance to stupidity of any sort. In every department of the state there should be a man or men to whom inventors can apply with security and confidence, and from whom they can receive a just, sensible, and speedy response. There is none, in any department, to whom they can now so apply, or from whom they can now receive such a response. They have to trust to interest, to accident, to caprice. Only last week an American inventor, hearing that his vessel was in the neighbourhood of the private residence of a gentleman of high official position, called upon him with a model, and obtained from him, without difficulty, a letter to the head of a department, for which letter, under ordinary circumstances, he might have vainly sought and sighed. This should not be so. The introduction of an invention should not be subject either to whimsical permission or to whimsical refusal. The worth and fitness of an improvement should be the only grounds of its acceptance—its want of these the only ground of its rejection.

If our views seem to have fluctuated in this article, it is because the truth of the matter fluctuates also. There are Daniel Doyces in the country, but all inventors are not such clever, quiet fellows as he, and many of them are as little like him as may be. There is no Circumlocution Office, but in many public offices there is a terrible amount of circumlocution, while in others the transaction of business could scarcely be improved. There is no great shoal of state Barnacles, but there is many and many an official gentleman who bears a very strong family likeness to those tenacious creatures, and who might be detached from his post with great advantage to the State.

CAST IRON PILLARS.

Experimental Researches on the Strength of Pillars of Cast Iron. By Eaton Hodgkinson, Esq., F.R.S., Professor of the Mechanical Principles of Engineering, University College, London.

In a previous paper on this subject ("Philosophical Transactions," 1840), I had shown, 1st, that a long circular pillar, with its ends flat, was about three times as strong as a pillar of the same length and diameter with its ends rounded in such a manner that the pressure would pass through the axis, the ends being made to turn easily, but not so small as to be crushed by the weight; 2ndly, that if a pillar, of the same length and diameter as the preceding, had one end rounded and one flat, the strength would be twice as great as that of one with both ends rounded; 3rdly, if, therefore, three pillars be taken, differing only in the form of their ends, the first having both ends rounded, the second one end rounded and one flat, and the third both ends flat, the strength of these pillars will be as 1—2—3 nearly.

The preceding properties having been arrived at experimentally, are here attempted to be demonstrated, at least ap-

proximately. The pillars referred to in my former paper were cast from Low Moor iron, No. 3; they were very numerous, but usually much smaller than those used in the present trials. I felt desirous, too, of using the Low Moor iron in the *hollow* pillars employed on this occasion, not on account of its superior strength, but its other good qualities. The pillars from this iron were cast 10 feet long, and from 2½ to 4 inches diameter, approaching in some degree, as to size, to the smaller ones used in practice. The results from the breaking weights of these were moderately consistent with the formulæ in the former paper, with a slight alteration of the constants, rendered necessary by the castings being of a larger size, and therefore softer than before, a matter which will be adverted to further on.

The formulæ for the strength of a hollow pillar of Low Moor iron, No. 2, where w is the breaking weight, in tons, of a pillar whose length, l, in feet, and the external and internal diameters, D and d, in inches, the ends being flat and well bedded, are as below:

$$w = 46{\cdot}55 \times \frac{D^{3.55} - d^{3.55}}{l^{1.7}}$$

from formula Phil. Trans. 1840:

$$w = 42{\cdot}347 \times \frac{D^{3.5} - d^{3.5}}{l^{1.63}}$$

from formula in present paper.

To obtain some idea of the relative strengths of pillars of different British irons, I applied, at Mr. Stephenson's suggestion, to Messrs. Easton and Amos, who procured for me twenty-two solid pillars, each 10 feet long and 2½ inches diameter, cast out of eleven kinds of iron (nine simple irons and two mixtures). The pillars were all from the same model, and were cast vertically in dry sand, and turned flat at the ends, as the hollow ones had been; two being cast from the same kind of iron in each case. The simple unmixed irons tried were as below, and all of No. 1:

		Mean Breaking Weight.
Old Park iron	Stourbridge	29·50
Derwent	Durham	28·03
Portland	Lovine Scotland	27·30
Calder	Lanarkshire	27·09
Level	Staffordshire	24·67
Coltness	Edinburgh	23·52
Carron	Stirlingshire	23·52
Blaenavon	South Wales	22·05
Old Hill	Staffordshire	20·05

The mean strength of the pillars from the irons above varies from 20·05 to 29·50 tons, or as 2 to 3 nearly.

The pillars formed of mixed irons were found to be weaker than the three strongest of the unmixed series.

From many experiments, it was shown that the weight which would crush the pillars, if they were very short, would vary as 5 to 9 nearly.

The pillars in general were broken of four different lengths—10 feet, 7 feet 6 inches, 6 feet 3 inches, and 5 feet—the ends of all being turned flat, and perpendicular to the axis. It was found that when the length was the same, the strength varied as 3·5 power of the diameter; and when the diameter was the same, and the length varied, the strength was inversely as the 1·63 power of the length. Both of these were obtained from the mean results of many experiments. The formula for the strength of a solid pillar would therefore be

$$w = m \times \frac{d^{3.5}}{l^{1.63}},$$

where w is the breaking weight, d the diameter in inches, l the length in feet, and m a weight which varied from 49·94 tons in the strongest iron we tried to 33·60 tons in the weakest.

The ultimate decrement of length, in pillars of various lengths, but of the same diameter, varies inversely as the length nearly. Thus the ultimate decrements of pillars 10 feet, 7 feet 6 inches, 6 feet 3 inches, and 5 feet, vary as 2, 3, 3½, and 4 nearly, according to the experiments, from which it appeared that the mean decrement of a 10-feet pillar was ·176 inch.

Irregularity in Cast Iron.—The formulæ arrived at in this paper are on the supposition that the iron of which the pillars are composed is uniform throughout the whole section in every part; but this was not strictly the case in any of the solid pillars experimented on. They were always found to be softer in the centre than in other parts. To ascertain the difference of strength in the sections of the pillars used, small cylinders three-quarters of an inch in diameter and an inch and a half high, were cut from the centre, and from the part between the centre and the circumference, and there was always found to be a difference in the crushing strength of the metal from the two parts, amounting, perhaps, to about one-sixth. The thin rings of hollow cylinders resisted in a much higher degree than the iron from solid cylinders. As an example, the central part of a solid cylinder of Low Moor iron No. 2 was crushed with 29·65 tons per square inch, and the part nearer to the circumference required 34·59 tons per square inch; cylinders out of a thin shell half an inch thick, of the same iron, required 39·06 tons per square inch; and other cylinders from still thinner shells of the same metal, required 50 tons per square inch, or upwards,

to crush them. As these variations in cast iron have been little inquired into, except by myself, and have never, so far as I know, been subjected to computation, I have bestowed considerable trouble upon the matter in an experimental point of view, and endeavoured to introduce into the formulæ previously given changes which will, in some degree, include the irregularities observed.

HEALD'S PATENT PICKERS FOR LOOMS.

Messrs. Heald, of Sabden Whalley, Lancashire, have recently patented an improved picker to be employed in looms, and also a method of packing the same. The main feature of the improved picker consists in having a narrowing or collar in the picker chamber to diminish its internal diameter, in order the better to retain an elastic packing fitted therein. The accompanying engraving is a perspective view of the picker; *a* is a hole for the spindle to work in; *b*, a rod to which the picking band is attached; *c*, a chamber running through the picker for holding a stuffing, which stuffing should be slightly elastic, and against which the shuttle is to strike; *d* is the picker foot, which may be solid, but, when required to lighten the picker, it may be bored out as shown at *e*; *f* is the collar, the form of which may be varied. The packing is so effected that when in the picker the rubber shall be in a stretched or elongated state, in order that the effort of the rubber to assume its natural form may cause it to fit the picker very tightly, and to retain therein in a compact state. The rubber is allowed to extend a little beyond the picker on each side to increase its durability. The following very ingenious means of packing the pickers are adopted by the patentees: India rubber cord is taken of a diameter larger than that of the chamber for the packing, and it is stretched till its diameter is smaller, than that of the hole by which the two sides of the chamber communicate. One end of the rubber, to the extent of about 4 inches, is then fixed by lapping it round with wire or string, or by casing in two half circles of metal hinged together and fastened by a catch; the cord is then relaxed, and the piece of rubber by which it was held beyond the string or clamps is cut off. Pickers are then strung on the cord over the string or clamps; the cord is then again stretched, and the pickers are slipped on to that part of it not covered with the string or clamps; the cord is finally allowed to resume, as far as it can, its natural form, when it will be tightly compressed in the picker. The cord should be divided into compartments before it is stretched, and each picker should be placed in the centre of one of these compartments.

THE ATLANTIC TELEGRAPH.

On Thursday morning, soon after the ships sailed for Newfoundland, and when at the distance of four miles from the landing-place, an accident happened to the thickest shore end of the cable, which became entangled with the machinery and broke at that point. The ships' boats underran the cable from the shore to the place where it was broken, and there the two ends were joined. The joint is said to be as perfect as any part of the cable; and the continuity and insulation of the whole length having been ascertained by the severest test, the squadron instantly set sail, and have kept up continued intercourse through the wire to the shore of Valentia since that time.

Thursday, Aug. 13.

Some accident has unhappily occurred. At four o'clock on Tuesday communication with Ireland suddenly ceased. The defect may be a temporary one; we hope for the best.

Burgess and Key's Reaping Machine.—The prize reaping machine, by Messrs. Burgess and Key, was exhibited on Friday last, at Osborne, before Her Majesty, the Prince Consort, the Emperor of the French, and the Empress, the Princess Royal, and Princess Alice. Their Majesties were pleased to express their unqualified admiration at the perfection of the working of the reaper, and their conviction that it must be of great benefit to the farmer; and to mark their approbation, each of them gave orders for France and England.

AN IMPROVED PRESS.

Mr. W. J. Brown, lace manufacturer, of St. Mary's Gate, Nottingham, has registered the improved press represented in the accompanying engravings. In fig. 1 A is the top of the press; B B, pillars; C, bed; D, screw; E, horizontal wheel; F, fly-

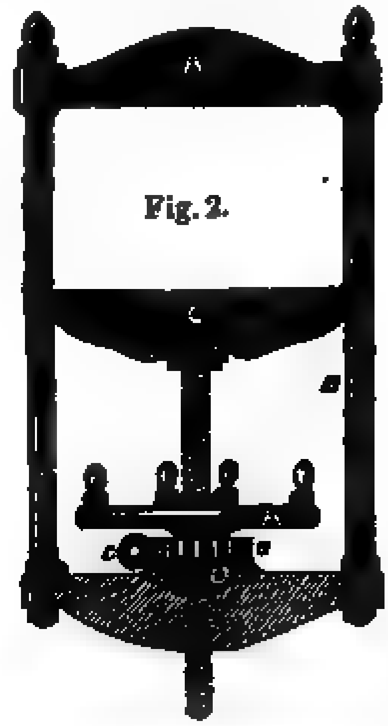

Fig. 2.

wheel. In fig. 2, A is the horizontal hand wheel; B, the worm wheel; C worm; D is the box through which the screw passes; and this box being made to revolve, drives the screw and the bed thereon up or down, according to the direction in which the box is turned. The purpose of utility arising from the shape and configuration of the new parts of this design consists in the upright motion obtained. None of the parts of this design are new and original with respect to the shape and configuration thereof; but the shape arising from the combination of the parts marked A B C and D, fig. 2, forms a new design.

WILLIAMS'S APPARATUS FOR CHARGING FURNACES.

Mr. C. Wye Williams, of Liverpool, has patented an apparatus by means of which coal or other fuel may be introduced into a furnace, and distributed rapidly and uniformly therein.

Fig. 1 of the annexed engravings is a longitudinal section of the improved apparatus, prepared ready to receive a charge of fuel; and fig. 2 is a longitudinal section of the apparatus after the discharge of the fuel

Fig. 1.

Fig. 2.

through the bottom. It consists of a box or drawer-like apparatus, being open at top to receive the charge of fuel; *a a* are a series of narrow metal plates, forming the bottom, each moving on pivots, *b b*; *c c* are chains, having one end attached to the horizontal rod or shaft, C D, and the other end secured to the falling edge of each plate, as shown in fig. 2; D, a winch handle, to rotate the shaft; and E E two handles.

It will be observed that one form of the

improved apparatus is of a drawer-like shape, entirely open at top, the bottom consisting of a series of parallel flat metal plates of any required width, and placed either across from side to side or lengthways from front to back end of the furnace, and are so arranged and attached that they may move somewhat like the laths of a venetian blind. On the shaft, C D, being wound up by the winch handle, the plates forming the bottom are raised and held in their horizontal position by a latch or other suitable catch retaining the winch handle in its place, and on its being removed the shaft is suddenly liberated, when the plates and their respective chains take the position shown in fig. 2. The catch should be so placed that it may be quickly disengaged, and the charging of the furnace completed in a few seconds of time. Before its being charged with fuel, the box or drawer laying outside the furnace, resting on one or more supports or on the ground, is filled, and on the door being opened, it is run or pushed into the furnace by the handles, E E; and on releasing the winch catch the horizontal plates fall suddenly by the weight of the charge of coal or other fuel, each taking a hanging vertical position. By this action the coal falling through the several spaces thus produced is dispersed over the entire surface of the remains of the previous charge, then in an incandescent state, and the box is rapidly withdrawn, and the door again closed. The width of the plates, and that of the spaces between them while hanging vertically, may be made of any required size, according to the nature and size of the fuel for charging wide furnaces; the side plates, A B, may also be hung on pivots, to deliver the fuel laterally and outwards. For the convenience of using the apparatus, it is furnished with the two handles or bars, E, projecting like the handles of a wheelbarrow on each side, and of any convenient length, so that the stoker standing between them may have full command of the box and the operation of charging with it; its weight being, when pushed in, supported by a cross bar or like means within the furnace while in the act of being pushed in and drawn out.

REFLECTORS FOR GASLIGHTS.—A Mr. Jobin, of Massevaux, France, proposes to preserve the polished surfaces of silvered or plated reflectors, by placing over them convex glasses of the same form as the reflectors. The system has been tried in an establishment where it was considered necessary to do away with metallic reflectors, the cost of repairing them being more expensive than an increased number of lights. The plan was found to succeed perfectly.

IMPROVED MEDICAL INDUCTION COIL.

MR. HEARDER, whose researches in electro-magnetism have been often before the world, and who, beyond all question, has shown himself to have been the first who manufactured and publicly exhibited the new induction coil in England, has recently applied his discoveries to the further improvement of his excellent medical galvanic machine, so as greatly to increase its power and efficiency, and consequently reduce its bulk. The great improvement which Mr. Hearder had previously effected in this instrument, by increasing its portability, and rendering it a travelling companion for the medical practitioner, obtained for him the highest eulogiums from Dr. Barnes and other eminent men. The late Dr. Pereira recommended the machine most highly in his last edition of *Materia Medica*. Dr. Letheby, one of our first practical scientific authorities, considers the machine as a fine example of the judicious application of scientific principles; and in 1846, Mr. Hearder obtained for this machine the silver medal of the Royal Cornwall Polytechnic Society. It is worthy of remark, that in its construction, Mr. Hearder employed precisely the same means of insulation as M. Ruhmkorff is now found to have used in his induction coil, viz., the separation of the layers of primary and secondary wires from each other by strips of paper, in addition to the ordinary covering of the wire; and it was perhaps owing to this circumstance that Mr. Hearder obtained static sparks from his small machines as early as 1842. Some of his larger medical machines, made fourteen years ago, give sparks 1-30 of an inch long, and show a bright light with charcoal points.

The only difference between Ruhmkorff's machine and Hearder's medical coil, is that Hearder used from 100 to 300 yards of secondary wire wound upon a bobbin with wooden ends, and Ruhmkorff used from 5,000 to 20,000 yards laid upon a bobbin with glass ends, paper being the only insulating medium used by both. The superiority of Ruhmkorff's over Hearder's simply depended upon the increased length and the additional application of the condenser. Reasoning out some of the phenomena which have presented themselves in the complicated action of his new induction coil, Mr. Hearder has been led to discover a peculiar relationship between the magnetic intensity of the iron wire, developed under various conditions of length, thickness, &c., and the quantity of electricity set in motion in the induced coil, and by attending to circumstances apparently trifling, he has succeeded in producing a medical coil, pos-

sessing an extraordinary power in a very small compass—a most valuable desideratum. In addition to this, he adopts a very ingenious contrivance for regulating the shock by the use of two indexes on the principle of the hour and minute hands of a clock, the first producing equal increments of power, and the second subdividing each of those increments so as to render the advance of power still more gradual. The whole of the apparatus, viz., coil, battery, a bottle containing the requisite quantity of dilute acid, insulated directors, conducting wires, and metallic plates for administering the shock, are cleverly packed in a small mahogany box, and are so contrived as to be used without taking out either the machine or battery. The machine extends to twenty or more degrees of power, the smallest being almost imperceptible, and the highest very much more than the strongest nerve can bear. The apparatus, altogether, is the most perfect of the kind that we have ever met with. At the late annual meeting of the British Medical Association, held at Plymouth, on the 22nd of July last, Mr. Hearder exhibited and explained his machine in the course of the conversazione, and showed its value as an adjunct to restore respiration in recovery from drowning. He mentioned a case which occurred some time since at Dartmouth, in which his apparatus had proved effective in the hands of Mr. Precy, surgeon of that place, in restoring a drowned person after all other appliances had failed, and life had been despaired of, and he also showed the facility with which the machine could be brought into action by opening the box in which it was packed, and exciting it ready for use in less than thirty seconds.

THE COMPARATIVE MERITS OF WIRE AND HEMP ROPES.

We learn from the *Liverpool Mercury* that a set of experimental tests was recently instituted to ascertain the comparative strength of wire and hempen ropes for the standing rigging of ships. The experiments were made at the corporation testing machine, King's Dock, Liverpool, and were witnessed by several merchants, shipmasters, and professional riggers. Besides the test of strength, there was also a trial to find the best method of fastening the dead eyes in wire ropes, whether by splicing or "turning in." The ropes of wire, hemp, and Manilla, were all of the manufacture of Messrs. Garnock, Bibby, and Co.

The following are the sizes and materials of the samples subjected to experiment, with the results:

		T.	C.
3¾ inch galvanised wire rope,	broken at	20	15
3¾ inch Manilla hemp,	ditto	5	17
3¾ inch Russian hemp,	ditto	4	15
3½ inch galvanised wire rope,	ditto	16	10
2½ inch galvanised wire rope,	ditto	8	10

There were also some experiments made with soft and hard wire rope.

The testing of the hempen ropes, proving the strength of Manilla to be so far superior to Russian hemp, took many by surprise. It was explained that the method of Messrs. Garnock, Bibby, and Co., in manufacturing Manilla, adds greatly to the strength of the rope. All their ropes are machine spun—a method which admits the whole of the fibre to be extended at full length, and the strength of the material obtained, whereas hand-spinning does not admit of the like advantage. The straining tests show the immense superiority of wire rope over that made even of the best fibrous material; but this is not the sole advantage it presents. Wire rope is a fourth less in weight, and not one-half the bulk of that made of hemp of the relative strength and enduring capacity. The advantage of this, especially in ships beating to windward, needs no comment. Moreover, the cost is 25 per cent. in favour of wire rope over hemp, estimating weight and saving. Again, wire rigging is much less susceptible than hemp of atmospheric changes, and needs no stripping or refitting. Wire rope seems destined to surpass, if not supersede, hemp rope in ships' standing rigging. Three-fourths of all the vessels now rigged in Liverpool are rigged with wire rope, Messrs. Garnock, Bibby, and Co. alone having either fitted or in orders twenty-three vessels for wire rigging during the present year.

From the experiments it appears that splicing is the best mode of fastening the dead eyes in wire rope.

The experiments made on the comparative resistance of hard and soft wires were greatly in favour of the hard wire. The hard wire was found to bear 60 per cent. greater strain than the soft. Both wires were the same, the one remaining precisely as when drawn, the other having been annealed. The annealed is the most pliable for splicing, but being found so much weaker, the decision was, of course, in favour of the hard wire.

The result of the testing, on Monday, shows that English energy and skill have been, as heretofore, crowned with success. Better and cheaper substitutes than Russian hemp have been found for those works of which it formed the great staple. Manilla, so much stronger—as the tests establish—is also one-fourth lighter, and much cheaper, than Russian hemp; besides, it does not

require tarring, and consequently must run more freely through the blocks.

During the war with Russia, and the consequent dearness of hemp, Garnock, Bibby, and Co., manufactured rope from cotton, and also from coir yarn. The latter is still used extensively, is found to wear well, weighs but little, and costs not more than about one-third of the price of Russian hemp rope. It has great elasticity, and on this account appears particularly well adapted for hawsers, warps, and such like.

TIMBER-BORING MACHINERY.

At a recent meeting of the Royal Scottish Society of Arts, Mr. Donald Rose, of Helmsdale, exhibited a machine for boring timber. He proposes to fix the auger to the end of a guide screw bar, working in a female screw, so as to force the auger into the wood to be bored. The screw bar forms the axle, on which there is a flywheel of 5 feet diameter, worked by two men; and the carpenter sets the machine to the proper place so as to bore in the proper direction. For smaller work he proposes a smaller wheel, to be driven by the flywheel, the auger or bit being fixed to the end of the screw bar, which is on the axle of the smaller wheel. He estimates that two labourers and one carpenter will thereby be able to do the work of fifty carpenters. After the description had been read, Mr. Sang made some remarks tending to show that more time would be lost in the application and adjustment of such a machine to the boring of treenail holes in ships than in boring by the usual method, and that such a machine would require to be stationary, and the work brought to it, in place of it being moved to the work. He gave, as an instance, Mr. Fairbairn's rivetting machine, a most useful one; but then the boiler to be rivetted was swung in such a manner as that any part to be rivetted could be brought exactly opposite to the rivetting machine. This could not be done with a ship on the stocks.

PAVING PUBLIC ROADS.

An improved method of causeway-laying, with a model of a regulating gauge to be used in preparing the foundation for the paving stones, was recently exhibited at the Royal Scottish Society of Arts by Mr. Thomas D. Bryce, Calton-street, Edinburgh. The advantages are stated to be economy, utility, durability, and comfort of a quick drying street after rain, and no splash, and the acceleration of the passage of the rain-water to his improved smooth surface gutters. This would greatly modify the objectionable friction and jolting caused in wheel carriages. The model of a regulating gauge to be used in preparing the foundation for street causeway is made of a light wood 30 inches long and 1½ inches broad, upon a scale of 1½ inches to the foot, and has a number of shifting perpendicular slides along each side, made of wood, and shod with zinc, and the number of inches marked upon each, to regulate to various depths and curves of street causeway, with attached thumb-screw nuts to hold the slides in their required position. The one row of slides to be used for the ground foundation of the causeway, and the shifting slides upon the other side to regulate the surface form, or top of causeway, and would enable any roadmaker to make any new causeway of the exact form of any other street, and it would show the amount of difference of formation of the various streets; and, when applied by any workman, along with the author's newly invented street parallel levels, would make the causeway of one uniform shape with the greatest facility and unerring certainty, and a more enduring foundation than the usual present mode of street causewaying. After some interesting remarks by the Inspector of Paving, and by various others, this communication was referred to a committee.

THE WELLINGTON MONUMENT.

The judges appointed to examine and report on the designs recommend that the prizes should be awarded as follows:—

Nos. First Premium, £700.
80.—W. C. Marshall, Esq., R.A., 47, Ebury-street, Eaton-square.
Second Premium, £500.
56.—W. L. Woodington, Esq., 22, Richard's-terrace, Lorrimore-road, Walworth.
Third Premium, £300.
36.—E. G. Papworth, Esq., 90, Milton-street, Dorset-square.
Fourth Premium, £200.
10.—C. G. Dupré, Florence.
Five Premiums, of £100 each.
12.—Messrs. M. Folcini and U. Cambi, Florence.
18.—A. Stevens, Esq., 7, Canning-place, Kensington.
20.—M. Noble, Esq., 13, Bruton-street, Berkeley-square.
21.—Herr E. J. Hähnel, Dresden.
63. T. Thorneycroft, Esq., 39, Stanhope-street.

The first of these successful designs, wrought in granite and bronze, has little which can offend the taste, and has beauties not discoverable at a first glance, but which gradually force themselves into view. Its chief characteristic is repose. The four standing figures at the base are, in this respect, very fine. But, beyond the fact that Valour, Peace, Wisdom, and Duty were his attendants, symbolized by the four figures labelled as above, you learn nothing of

Wellington. There is on one side a woman, with an infant, bending over a dead body; and on the other two recumbent figures, which we are informed are Commerce and Agriculture rejoicing. The pleasure which is derivable from one of these illustrated facts is quite neutralized by the painful reflections inspired by the other.

The second prize, like the first, shows the hand of the genuine artist in the details, and especially in the figures at the base—Devotion, Energy, Order, and Decision; but like it, also, it is deficient in expression and poor in design.

Either of them might have been erected to almost any good soldier, and both are, in our opinion, certainly unworthy of England's Great Chief.

The third prize, and, perhaps, the most remarkable design in the whole exhibition, representing the Angel of Death closing the door of the tomb, and with the finger of silence on its lips—inspires a feeling so different from that which places Fame, with its pealing trumpet, at the tombs of those whose deeds we would hold in perpetual remembrance, that for this defect, if not for others, we must agree with most of our contemporaries in convicting the artist of bad taste.

No. 10, which received the £200 prize, is, in our view, inferior to several others which have received no prize, and which are within the prescribed limits of size. Nos. 20 and 21, to which only £100 have been awarded, are, we think, greatly superior to it.

We said in our last number that none of the designs exhibited came up to our idea of what the occasion requires, and we made a demand upon the inventive genius of our countrymen to produce something as worthy of the Iron Duke as is Tennyson's Ode. In answer to our challenge a friend writes:

"The monument should, in my judgment, answer the following conditions:—

"It should be, if possible, *unique*, and not the same in kind as, and inferior in execution to, those erected in honour of men who have been born to greatness, and have achieved none.

"It should give a good and enduring model of the head of the Duke, large enough to be easily seen from the ground. Nothing is more interesting than to study character in these records of departed greatness.

"The features of accessory figures should be less distinct, either from size or distance, than those of the hero, which alone are worthy of being studied and remembered.

"If the design is allegorical, the allegory should be so simple as to be easily apprehended by the popular sense, without the aid of explanatory writing.

"Lastly. It should show that it is no private tribute to his memory, but a monument raised by a grateful nation—a nation for whom he won forty years of peace, during which she had leisure to cultivate the arts.

"Had I been a sculptor instead of a mechanic, I should have submitted, in accordance with these conditions, the following design:

"Erect a block of granite as large as the space will admit, and of the shape required for making a sedent figure. Round the block, and resting on its rugged base, dispose four figures in white marble, life size. On the left, Britannia as a sculptor, leans on the shoulder of the block from which she has just developed the colossal head, and struck out the well-known features of Wellington. On the right an angel, seen in profile, holds a wreath over the head which she is about to crown. A beautiful girl, with a gentle and happy face, reclines in front, and, directing attention to the face of Wellington with one hand, rests the other on the head of a lion, stretched out in front of her. A dove placed on her shoulder would show that she is intended to represent Peace; while the helmet on the head of Britannia, and the shield at her feet would completely identify her. The crown in the hands of the angel may be supposed to be either that which man accords, or that which fadeth not away.

"I think the design is so simple that none could mistake its superficial meaning; and I hope there are many of your readers who will see in it a peculiar fitness, not visible to matter-of-fact people, and not readily capable of explanation in your valuable pages."

We insert this communication with genuine pleasure. The perfect originality of conception displayed in the proposed design may, indeed, be too much for many a conventional artist, but will be welcomed by more liberal readers, who will feel themselves free to admire the magnificence of the tribute which such a monument would offer to the memory of Wellington If such a monument failed to perpetuate all those specific virtues which Wellington eminently possessed, it would at least, in its simple grandeur, show to succeeding ages that the Great Duke was loved and revered by the whole nation, that his fame was believed to be eternal, and that the genius and prowess of the man upon whose countenance they gaze, won for his own age the boundless blessings of security and peace.

The following letter has also been received, and will be read with interest:

To the Editors of the Mechanics' Magazine.

Gentlemen,—In your last week's impression you complain of the dearth of pure, artistic, original, and meritorious design in the drawings for the Wellington monument now under consideration by the nation; and at the conclusion of your remarks you state that as it is the artist's province to provide a fitting design, you do not undertake to suggest improvements. The interest which you take in the matter, however, is evident from the space which you have given to the consideration of the subject. Indeed, no lover of his country can fail of experiencing a lively interest in such a question—a question which involves not only the fitting honour of the hero intended to be glorified, but the artistic genius of the present age. Perhaps, therefore, it would not be out of place to suggest that another class of artists be invited to contribute their mite towards the furtherance of the wishes and desires of the nation. I mean inventors, who, as a class, are Nature's truest and most original artists. They form the most gigantic conceptions, and work them out in the grandest and most enduring manner, the wide world being their canvas, and rugged Nature's hidden treasures their painting materials. Let them, then, be invited to hew out of the rock of truth fitting ingredients for a monument to the honour of Wellington, and then let the pictorial artist come in to give form, and order, and loveliness to the same.

The form of monument which I would venture to suggest is as follows:—On the highest point of a rugged, rocky road—the road of life—stands the MAN Wellington, stately, composed, compassionate and majestic as the artist's powers can depict him. Beside him is a chasm in the rock, out of which chasm a number of imps, the representatives of despotism, usurpation, avarice, calumny, insult, ridicule, ingratitude, &c., are striving to rise. These imps should not be huddled promiscuously together, as in the vision of a night-mare, but each one should have a distinctive feature and attitude independent of its name, which should also be written upon its dismantled covering or its broken weapon. Above the chasm the lowered and expanded hand of Wellington should be resting, expressive of the potency of that hand which, even in its stillness, could keep them all in check. The hero does not even deign to look down into the chasm, or to wield a sword over it; for although he firmly grasps a sword in his left hand, and slightly leans upon it, MIND, and not fire or steel, is his chief weapon. Before him Fame is seen kneeling and tendering to the hero a laurel crown. Beside her is a book of reference, in which is recorded, in golden letters, the mighty achievements of the warrior and statesman chief. Fame is on the same level of the rock as the hero, thus implying that he had risen to the highest pinnacle of human fame. Her stooping or kneeling position, however, prevents the idea of interference with or abstraction from the *oneness* of the design in which the figure of Wellington himself should be the all-absorbing and all-important feature. In the background the embodied chronicles of Wellington's past prowess should be seen rising gracefully from the burning urn of Time. These pictures should be in white marble, and in slight relief. In the far, far distance cherubim and seraphim are receiving the hero's ascending glories, and joyously though reverently transferring them to a great book, the book of infinite futurity.

I am, Gentlemen, yours, &c.,

William Green.

Pembroke Cottages, Caledonian-road,
Aug. 10, 1857.

BOAT-LOWERING APPARATUS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Such of your readers as perused with as much care as your correspondent "Spectator" describes himself as having done, the article in your magazine of the 18th July, on "Captain Kynaston's method of Lowering Boats at Sea," and also the letter in question, must have been struck with the contrast between the fair and liberal spirit in which the former was conceived, and the evident partisanship displayed in "Spectator's" epistle.

"Spectator" finds it necessary to excuse his interference, and gives two reasons why he could not let your article pass without comment. His first, because he considers it "likely to be indirectly productive of serious injury to Mr. Clifford;" and his second, because he considers that Captain Kynaston has "somehow been invested with honours to which Mr. Clifford has a just and indisputable claim."

I propose in turn, with your permission, to offer a few remarks upon "Spectator's" strictures.

Is the Editor of a magazine especially devoted to such purposes to refrain from noticing rival inventions, because, forsooth his remarks may be indirectly productive of injury to one or other of the inventors? A mechanical invention, like any other work of the brain, must stand or fall by its own merits or demerits.

Again, surely Mr. Clifford, with "his remarkable zeal in urging forward his inven-

tion," and with the substantial results of that zeal displayed in the adoption of it "to a large extent in every description of sea-going ships," has had ample opportunities of earning those honours and emoluments to which he has, according to "Spectator," "a just and indisputable claim; and of retaining them if the merits of his invention be such as to deserve that he should do so. Honour is sweet; but it is not suggested that Mr. Clifford is actuated purely by patriotic and philanthropic motives; he had the field all to himself for some time, but now finds "another Richmond" come to dispute the palm with him, and *hinc illæ lacrymæ!*

"Spectator" declines entering into any discussion upon the merits of the respective inventions. All he says is, that the best points of Capt. Kynaston's plan are also found in that of his rival; but the converse will not hold; what is bad in the latter is remedied in the former. The "chief feature" of each is an application of the lever principle of the roller, a mechanical agent known to the world ever since the days of Archimedes; but the two applications are the antithesis one of another, and were well contrasted in the *Times* some time since, as those of the humming-top and the cross-bow.

"Spectator" says that objections of equal weight to those urged by Captain Kynaston against Mr. Clifford's method, "might be brought to every conceivable mode of effecting the same object;" but his (Clifford's) "threefold friction sheaves," upon the originality of which he prides himself, and which are peculiar to his method, are open to an objection from which the others are free, while the barrel or roller—the "chief feature"—is also found both in Jeffreys' and Lacon's inventions, the difference between Clifford's plan and theirs in this respect consisting in the fact that he lowers from the *boat* instead of from the *ship*—this being, in the case of imminent danger and a rush to the boats, one of the main objections to his method, as putting too dangerous a power into the hands of a panic-stricken crew or passengers. As regards "Spectator's" insinuation, which it appears to be the main object of his letter to diffuse, Captain Kynaston's character stands too high to render it necessary for him or any one else on his behalf to notice them.

If "Spectator" and Mr. Clifford's other admirers think proper to hold him "secure from injury," no one will quarrel with them for doing so; but "Spectator," in his zeal, and his inability to resist the temptation held out to him in the shape of an opportunity for an elaborate peroration, seems to prove *too much*; for Mr. Clifford can hardly fear the "just and fair reward he has within his grasp," being "struck from his hand," without confessing that Captain Kynaston's invention has a superiority over his own, which, if I mistake not, he is hardly disposed to concede to it.

I am, Gentlemen, yours, &c.,

FAIR PLAY.

London, Aug. 6, 1857.

THE METROPOLITAN POSTAL DISTRICTS.

3, St. James's-gardens, Haverstock-hill, Aug. 10, 1857.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Your number of the 18th July contained a suggestion from the Rev. Mr. Sikes, of Sevenoaks, for the manufacture of envelopes with the postal district initials on them.

Allow me to state, that on the announcement by the Post Office, at the end of 1856, of the division of London into districts for postal purposes, I submitted to the Post Office people a comprehensive plan for applying the district initial system to envelopes, stamped letter paper, and for impression on the penny postage stamps, and also by means of small adhesive labels on the letters. The Post Office intimated that it was an improvement they could not themselves officially carry out, but suggested that it was a matter for the stationers to take up.

I introduced the plan, with specimens, to some of the leading stationers, who in their turn seemed to think it was a matter for the Post Office to promote; and nothing more was heard of the matter until within the last month or two—during which period my originally proposed plan had become developed—but without any participation on my part in it, in most of the leading stationery establishments of the metropolis. Not being a manufacturing stationer, I could not carry the system out myself, and I further found that it could not be registered or patented; all that I could do being to enter it at Stationers' Hall.

I mention the matter, with your kind permission, to show how the suggestion in your valuable journal has been anticipated, and how gracefully and gratuitously it has been acted on by the *par nobile fratrum* of stationers and Post Office—whose purpose it mutually answers—the latter now regularly stamping the postal letter paper and envelopes of the former with the district initials for transmission by post.

I remain, Gentlemen,

Your old Subscriber,

CHARLES MAYBURY ARCHER,

Member of the Press.

MISCELLANEOUS INTELLIGENCE

ARTIFICIAL MARBLE.—Mr. Felix Abate, of Naples, communicated to the French Academy of Sciences, at its last meeting, a new system of moulding which gives to plaster the hardness and durability of marble. He places the plaster in a drum turning horizontally on its axis, and admits steam from a steam boiler; by this means the plaster is made to absorb in a short space of time the desired quantity of moisture, which can be regulated with the great-

est precision. With plaster thus prepared, and which always preserves its pulverulent state, he fills suitable moulds, and submits the whole for a short time to the action of an hydraulic press. When taken out of the moulds, the articles are ready for use. This process is simple and economical, the cost of the manufacture very little exceeding that of the material. The plaster thus prepared is perfectly hard and compact, taking the polish of marble. The most delicate bas-reliefs and highly finished medals may be produced from it with the same perfection as they have in the original. An experience of three years has shown that productions obtained by this process resist the most unfavourable atmospheric influences; it can therefore be employed as well for works in the open air as for the interior of buildings. Mr. Abate proposes to employ this substance for all ornamental purposes where marble or stone has been hitherto employed, and from calculations which he has made, he is of opinion that it will cost but a fifth or sixth of the price of cut stone of the first quality.

Killing and Curing Pigs by Steam.—In a work on the United States, Mr. Oscar Commettant gives an account of the application of steam machinery to a very singular purpose—the killing and curing of pigs. He tells us that at Cincinnati an apparatus driven by steam is so arranged that, on a number of pigs being driven into a sort of funnel, they are taken one at a time, cut across the throat by knives, seized hold of by hooks, plunged into a hot well, passed through a brushing cylinder which scours the hair from them, severed below from tail to snout, disembowelled, cleft into joints, salted, and barrelled, all in the course of a very few minutes. Hundreds of pigs are taken, we are told, daily to this establishment to be treated in the above highly ingenious and agreeable manner.

Condensers for Marine and other Steam Engines.—Mr. William Cuthill, Clydebank Foundry, Glasgow, in a paper read at the Royal Scottish Society of Arts, proposes to have the steam condensed by means of a series of tubes traversing the condenser, which may be joined into one or more, before and abaft the engine, and continued in both directions diagonally through the ship's side, so that when the vessel moves forward the water will rush in at the fore pipe, through the tubes in the condenser, and exit by the after pipe, and *vice versâ* when the vessel moves backwards.

An Improved Pump.—On Saturday, at noon, a large number of ship captains and other gentlemen attended at Messrs. Ogden and Barves, Brunswick Dock, for the purpose of witnessing the trial of a pump invented by an American captain named Palmer, and very recently patented in England by one of our transatlantic cousins, Captain Millard. We should state that the largest pump Captain Millard has at Liverpool was also shown to our reporter, although it was not in use. It consists of a wheel chamber, between three and four feet in diameter, with a suction and discharge pipe attached, all of cast iron. The latter is 15 inches in diameter. In the chamber is a perpendicular four-armed wheel, which, when in operation, is made to revolve very rapidly; and thus, on the principle of atmospheric pressure and re-action, the water is raised and discharged at the rate of 17,000 gallons a minute. — *Liverpool Daily Post.* [We should not like to pronounce an opinion upon the merits or the novelty of this pump without further information respecting it. There is no recent patent for it in Captain Millard's or Mr. Palmer's name, although there may be one in the name of an agent. Eds. M. M.]

The American Breech - Loading Guns.—Mr. Eastman's six breech-loading cannon, recently imported from America, were yesterday tried on the Arsenal Wharf, Woolwich, under the supervision of Lieutenant-Colonel Wilmot, Superintendent of Government gun factories at Woolwich, and having been twice fired with a double charge of blank cartridge—namely, 20lbs. of powder—they were examined, and found to have stood the test satisfactorily. From their enormous weight—17 tons—they did not evince the slightest recoil.

Mr. John Clare, of Liverpool.—We learn from a contemporary, what we scarcely expected to hear so soon after the appearance of our article upon this gentleman, viz., that an attempt is being made at Liverpool to set on foot a public subscription for him. We have no doubt that many other gentlemen who have grumbled a good deal and done but little, would be quite willing to receive similar assistance.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Emmons, E. J. *A new or improved nursery chair.* (A communication.) Dated Dec. 1, 1856. (No. 2841.)

This chair cannot be described without engravings.

Vertue, G. J. *An improvement in deodorizing sewage waters and sewage matter, when lime is used.* Dated Dec. 1, 1856. (No. 2842.)

Claim—The mixing the lime, while it is still hot from the burning, with water, and

then adding the mixture to the sewage to be deodorised.

Peabody, F. *Improved apparatus for obtaining motive power by the action of the wind.* Dated Dec. 1, 1856. (No. 2843.)

This relates to windmills on the principle patented by the patentee, 28th March, 1855. In the specification of this patent the force of the wind upon a rotating wheel is described as governed and brought under control by a disc set behind the wheel. He now proposes to simplify the mechanism employed.

Ramsden, J. C. *Improvements in apparatus or the mechanism of looms for weaving a certain class of plaids, checks, and fancy woven fabrics.* Dated Dec. 1, 1856. (No. 2844.)

This relates to looms employed in the weaving of fabrics where several shuttles are required, and in which circular or rotary shuttle boxes are employed; and consists of peculiar mechanism for actuating the shuttle boxes so as to produce the changes of weft required by the pattern to be woven.

Monnier, N. *Improvements in bridles and bits for stopping horses.* Dated Dec. 1, 1856. (No. 2846.)

This consists in the application of certain apparatus by the aid of which the patentee can double, treble, quadruple, and still further increase the effect of a man's strength upon the horse in controlling it.

Longbottom, J. *Improvements in apparatus for drying, roasting, carbonizing, and calcining vegetable, mineral, and animal substances.* Dated Dec. 2, 1856. (No. 2849.)

This consists of a chamber, the sides and top of which are made double, so as to admit of the chamber being heated from a furnace for that purpose, the heated air and flame circulating freely through the space left in the top and sides. The bottom of the chamber is heated by a series of hot water pipes. When he uses two furnaces or fireplaces he places them at opposite ends of the apparatus.

Brooman, R. A. *Improvements in bleaching.* (A communication.) Dated Dec. 2, 1856. (No. 2851.)

This applies to the bleaching of textile fabrics, cloths, cottons, rag, pulp, and vegetable fibres; and consists in certain methods of bleaching by means of chloride of lime, employed in combination with certain agents by means of which the material under treatment is preserved from the injurious effects which the chloride of lime might otherwise exercise.

Brooman, R. A. *A chemical composition or agent to be employed in the dyeing of wools and woollens.* (A communication.) Dated Dec. 2, 1856. (No. 2852.)

This is intended to be used in dyeing wools and woolens as a substitute for tartaric acid, cream of tartar, and argol. The patentee prepares stannic chloride by mixing about 1¾ oz. of bay salt, or sea salt, 8¾ lbs. muriatic acid, 2¼ lbs. nitric acid, and dissolves tin in the liquid thus obtained. The composition for dyeing is manufactured by dissolving one part of oxalic acid in ten parts of hot water. It is then stirred. One part of the stannic chloride is next dissolved in ten parts of cold water, and stirred. He then adds, for every part of the stannic chloride, two parts of sulphuric acid, stirs again, and when the two solutions are cold, mixes them together, stirs and leaves them to settle for about 20 hours before using.

Brooman, R. A. *Improvements in pumping engines and in pumps.* (A communication.) Dated Dec. 2, 1856. (No. 2853.)

This consists principally in an arrangement and construction of pumps, including air-pumps, together with the manner of coupling the same to the engine, and the method of operating the valves. The object is to obtain a perfect balancing of the engines without the aid of counter weights, and to employ the double-acting engine, whereby a more economical working is obtained. By this arrangement, although but one pump is used, it is made double-acting.

Girard, L. D. *Certain improvements in hydraulic turbines.* Dated Dec. 2, 1856. (No. 2854.)

This consists of an improved arrangement of turbines, and includes an arrangement of the wheel of the turbine, or of the channels in which the impulsive action of the stream of water is exerted, according to which the sides of the wheel are widened or enlarged in such manner that, with certain curved vanes forming the sides of the channels, the most efficient action of the stream of water is obtained.

Fowler, J. *An improvement in the manufacture of wire ropes.* Dated Dec. 2, 1856. (No. 2855.)

This invention was described at page 563 of No. 1766.

Dryden, R., and S. Miles. *An improvement in the construction of cylinder printing presses.* Dated Dec. 2, 1856. (No. 2857.)

This consists in the application to cylinder perfecting machines (in which the paper is fed in by tapes) of an additional feeder for placing under the sheet to be printed, as it comes into the second cylinder, a second sheet which shall take the set off from the printed sheet, and thus insure clean impressions.

Townsend, M. *Improvements in machinery for the manufacture of knitted fabrics.* Dated Dec. 2, 1856. (No. 2858.)

This relates—1. To the application of the jacquard apparatus for moving the

hooks, guides, or needles of knitting machines so as to produce figured patterns upon looped or knitted fabrics. 2. To arranging rows or circles of double-ended needles, having hooks or beards at both ends, and in working them in a peculiar manner for forming the loops thereon in the manufacture of knitted fabrics. 3. To arranging double rows or circles of needles or hooks to make knitted fabrics, in such a manner that they will be placed in an inclined partition in lines crossing each other, and will be maintained in their proper positions by springs, but may be driven downwards by a slur cock or driver striking the lever or sliding pins as they are moved round in the circular machine, or backwards and forwards in the straight machine, as may be required. 4. To a mode of making circular knitted warp fabrics by means of a row of needles provided with hinged beards, such needles being arranged in a circular form in combination with a circular arrangement of lever guides for carrying the threads to form the fabric.

Siemens, F. *Improved arrangement of furnaces, which improvements are applicable in all cases where great heat is required.* Dated Dec. 2, 1856. (No. 2861.)

This consists in so arranging furnaces as to recover the heat which is still contained in the flame on passing away from the fireplace or flues, towards the chimney, by causing that heat to be imparted to the atmospheric air, gas, &c., employed to maintain combustion in the fire-places.

Mizen, J. *Improvements in apparatus for making gas, partly applicable to culinary or other domestic purposes.* Dated Dec. 3, 1856. (No. 2862.)

The apparatus consists of a retort of a cylindrical, or other form, which is to be applied at the back or side of an ordinary domestic range with boiler and oven as usual. This retort is intended to distil coal, bones, and fatty matters, or any material from which gas can be evolved by distillation. The top is to be closed by means of a lid, and is furnished with a pipe for conveying away the gas. This pipe is provided with union joints and a stop cock, and conveys the gas to a purifier, whence it passes into a gasometer to be used for lighting, cooking, and other purposes. The lid of the boiler attached to the domestic range is provided with a hole, in which is inserted a pipe having a funnel-shaped head to receive liquids intended to be warmed, the lower end of the pipe being closed or provided with a stop-cock for the purpose of drawing off the liquids.

Kurten, P. *Improvements in the manufacture of mottled soap and yellow soap.* Dated Dec. 3, 1856. (No. 2863.)

This consists—1. In producing mottled soap by boiling any fatty matter with soda lye, and then mixing it with a soap formed of cocoa-nut oil, soda lye, and lye of potash. 2. In producing yellow soap, by dissolving tallow or palm oil together with resin, and adding lyes of soda and of potash.

Gatty, F. A. *Improvements in the construction of filters or drainers.* Dated Dec. 3, 1856. (No. 2864.)

These are particularly applicable in the manufacture of garancine, but may be used for other purposes. They are made by preference of wood, and of a square shape. The sides and bottom are furnished with narrow slots, which may be filled with animal charcoal or other purifying material.

Rider, E. *Improvements in the manufacture or treatment of gutta percha.* Dated Dec. 3, 1856. (No. 2865.)

This consists of a mode of treating gutta percha by the addition to sixty-six parts of that gum of one part of sulphur, and one part of litharge, prior to the exposure of the same to the action of from 235° to 245° Fahr. for the purpose of expelling the volatilizable ingredients therefrom, and the after process of vulcanization of gum so prepared by subjecting the same to a heat of from 255° to 265° Fahr.

Crabtree, T. *Improvements in card-setting machines and in certain machinery or apparatus employed in the construction thereof, which apparatus is also applicable to similar purposes.* Dated Dec. 3, 1856. (No. 2866.)

This consists in the employment of duplicate or counter tappets, or cams on the main shaft for working the slides or levers of card-setting machines, whereby the springs now used in conjunction with tappets are dispensed with, and the machines are rendered more certain in their operations. Also in machinery for cutting or constructing the aforesaid tappets or cams.

Bullough, A. and W. *Improvements in looms.* Dated Dec. 3, 1856. (No. 2867.)

This consists in causing the dobby or lags employed in fancy looms, to act upon two slides or lifters, the one ascending as the other descends, thereby maintaining a perfect equilibrium by balancing each other. Or the patentee employs two dobbies on a loom, the one ascending as the other descends, there being a pattern cylinder and a row of wires for each dobby. He also regulates the taking-up motion for the purpose of producing thick or thin cloth when desired.

Genhart, H. *Improvements in fire-arms and ordnance, and of the cartridges or projectiles to be used therewith.* Dated Dec. 3, 1856. (No. 2868.)

This consists principally in arranging and disposing the chamber or revolving

breech containing the projectiles horizontally instead of vertically; also in improved cartridges or projectiles to be used therewith.

DENIS, J. *Improvements in apparatus for corking and uncorking bottles without leaving any air between the liquid and the cork.* (A communication.) Dated Dec. 3, 1856. (No. 2869.)

This consists of apparatus for corking bottles without leaving any air between the cork and the liquid; and also of a corkscrew peculiarly applicable for uncorking bottles stoppered in the aforesaid manner. Neither improvements can be described without engravings.

DEELEY, J. *Improvements in furnaces for smelting and melting.* Dated Dec. 3, 1856. (No. 2870.)

This consists in an improved form of grate, and in a new arrangement of the flues in smelting and melting furnaces; it also consists in feeding the metal and coke, or other fuel, in two or more compartments, instead of one only.

CHEETHAM, J. K. *Improvements in the application of photographic pictures to metal and other surfaces, and in rendering the same applicable as printing surfaces.* Dated Dec. 3, 1856. (No. 2871.)

This relates — 1. To obtaining designs upon metallic surfaces so as to constitute pictures, which may remain so or upon which the engraver may work by any of the usual methods. The principle proceeded upon is to obtain a photograph by any ordinary means, and transfer the reduced silver to the metal free from the film which supported it, and in direct contact with the metal. 2. To a method of obtaining surfaces for printing from photographs. For this purpose he proceeds according to the first part of the invention above described, so as to obtain the silver picture upon a surface of copper or other metal, and then treats the plate with nitric acid, which will eat away one portion of the surface and leave the other in relief. 3. To obtaining printing surfaces upon the lithographic principle. To effect this the inventor renders the stone a conductor of electricity by a coating of phosphorus or other suitable substance, and deposits a film of copper or other metal therein. Upon this he transfers the design as before described. The stone which was beneath this is then run over with the inking roller, and the metal picture subsequently removed, leaving a clear surface of stone for the light portions; or this operation may be reversed.

APPERLY, J., and W. CLISSOLD. *Improved machinery for preparing fibrous substances for spinning.* Dated Dec. 4, 1856. (No. 2874.)

This relates to delivering the sliver from one preparing machine to another, and so making the preparation process continuous. The patentees lay the sliver diagonally in parallel serpentine rows on the feed apron, but it may also be laid at right angles to the line of progress of the apron; or a smooth fixed table in front of the rollers may be used to receive the sliver; the pressure of each row delivered on to such table serving to press the sliver forward under the bite of the rollers.

STUART, L. C. *Improvements in drying sized paper.* (A communication.) Dated Dec. 4, 1856. (No. 2877.)

This consists in passing the sized paper over and between a series of oblong cylinders, placed one above the other, and having their surfaces perforated with small holes through which currents of graduated heated air are forced, which escape and come in contact with both sides of the paper after leaving the sizing vat. The series of cylinders, and the paper between them are exposed to the open air, so that the vapour may be free to escape, and not run with the paper to be again absorbed by them.

BELLFORD, A. E. L. *Improvements in drying, burning, and cooling bricks, tiles, and other ceramic substances.* (A communication.) Dated Dec. 4, 1856. (No. 2882.)

This consists of a method of effecting the drying, burning, and cooling of ceramic substances, so that the different changes from cold to heat, and *vice versâ*, may be gradual, thus avoiding a great amount of breakage; also in the oven being so constructed as to allow the three operations to be conducted without intermission all the year round.

CRAWFORD, D. *Improvements in washing, cleansing, and preparing textile fabrics and materials.* Dated Dec. 4, 1856. (No. 2884.)

This consists of a rectangular frame, fitted up with rollers, dash boards, a dashing frame, and driving gearing, so that the fabrics passed through the machinery shall receive a complete washing and cleansing. The frame is divided into a series of storeys or flats, one above another, each flat having a dash floor or a fixed platform divided down the centre, towards which division line each half inclines downwards. The goods, in a continuous rope-like form, are passed through the machinery and acted upon by jets of water, &c. Afterwards the fabric falls loosely, and opens so as to have what may be termed a loose or open washing.

DAVISON, R., and J. CROWTHER. *Improvements in machinery for winding yarns or threads on bobbins or pins fixed on spindles driven by gear or cogged wheels, and for winding weft, for either hand or power looms.* Dated Dec. 5, 1856. (No. 2885.)

This consists in a peculiar construction and arrangement of the spindles upon which the bobbins or pins are placed when being filled, and of the parts in connection with such spindles, whereby they are driven or their motion is suspended.

MOORE, H. *A boot and shoe stud.* Dated Dec. 5, 1856. (No. 2886.)

The stud consists of a flat disc, with a shank to the same composed of copper wire, soldered to the disc, the two shafts or sides of the shank being close to each other, and fit to be inserted into a small hole to be made through leather, cloth, &c., and passed through a small hole in the same, sufficient to receive the said shank only. And after the shank is passed through such hole, it is intended to expand the same on the outer side of the leather, cloth, &c.

KERDYK, L. P. *Certain improvements in machinery or apparatus for extracting colouring matters to be employed for the purposes of dyeing, or for other similar processes.* Dated Dec. 5, 1856. (No. 2890.)

The apparatus consists in an interior case or chamber covered with wire cloth and perforated plates, &c., and revolving at a high velocity, inclosed in an exterior chamber or case. The pulverized wood or root, &c., is placed in the internal chamber, and rotary motion being imparted thereto, water is introduced, being driven or filtered out by centrifugal force through the sides of the case, and the insoluble matter remaining behind is removed when requisite. The liquid thus separated may be passed into the dye, and out through the machine again, and so on, as often as necessary, until the colour is sufficiently extracted from the roots, &c., employed. Also in the use of an arrangement of the above-named apparatus in combination with a centrifugal disc pump, so applied as to act as an auxiliary power in addition to the centrifugal power, to facilitate the progress of the filtration or extraction of the colouring matter; and, lastly, in the general arrangement of the whole apparatus.

OGDEN, H., and H. HIBBERT. *Improvements applicable to colliery and locomotive engines for the purpose of arresting or retarding their motion at required intervals, and of indicating the amount of work done in relation to such intervals.* Dated Dec. 5, 1856. (No. 2892.)

As applied to colliery engines, the patentees claim—1. The employment of an extra steam cylinder, to which steam is admitted by a revolving cam or cams, so as to bring the break into action. 2. The employment of a revolving cam or cams for gradually or at intervals operating upon the throttle valve of the working engine. 3. The employment of a revolving surface for showing the position of the load being raised, and any one of the above portions of the invention may, if desired, be used separately. As applied to locomotive engines, the employment of a disc with cam or tappet moving in proportion to the speed of the engine.

HOOPER, W., J. FRY, and G. NASMYTH. *Improvements in springs for railway carriages, and for other purposes.* Dated Dec. 6, 1856. (No. 2893.)

The patentees take tubes, or sections of tubes, or cylinders, or rings of vulcanized india-rubber, and apply them so that the elasticity is produced by the compression of the cylinders, tubes, or rings in the direction of its or of their diameter, and where several tubes or cylinders are combined, the variation of the position of the parts of the several rings, or of the extent of their surfaces in contact, will give varying or increasing degrees of resistance and of elasticity.

BOWERS, W. H. *Improvements in apparatus to be used for the purpose of distillation.* Dated Dec. 6, 1856. (No. 2894.)

This consists in the arrangement of apparatus in combination with a retort or vessel for the distillation of sawdust, wood turnings, small chips, &c., for the purpose of propelling such substances through the retort or vessel and discharging the charcoal from the same after carbonisation in a more efficient manner than heretofore.

SCHIELE, C. *Certain improvements in machinery or apparatus for cutting nuts, screws, or bolts, and toothed wheels.* Dated Dec. 6, 1856. (No. 2896.)

These improvements are designed to obviate to a great extent the reciprocating or periodical action in cutting or tapping nuts, in cutting bolts or screws, and in cutting or trimming the teeth of wheels, and consist of several arrangements of parts combined for the above purpose.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

BROOMAN, R. A. *Improvements in pumps and in pumping.* (A communication.) Dated Dec. 2, 1856. (No. 2850.)

This is a method of preserving the momentum imparted to the column of water in the act of raising it, whereby a steady stream will be delivered, while the durability of the several parts is much increased, since the strains consequent upon the slamming of the valves are entirely avoided. It consists in the employment of three or more separate buckets in one pump, which are made to act upon the column of water in such manner that one of the buckets shall be commencing to lift just as one is ceasing to do so, and in so commencing

shall take the water at precisely the speed at which it was moving as the other was about leaving it.

APPERLY, J. *An improved fabric applicable to the manufacture of feed cloths or aprons.* Dated Dec. 2, 1856. (No. 2856.)

The object here is to produce a fabric which, when made up into feeding cloths or aprons, will form an even travelling surface, not liable to shift laterally, or pucker. The inventor introduces into the shed while the cloth is being woven, wires or strips of whalebone, parallel with the weft, and weaves these substances into the fabric after the manner of weaving in terry wires.

BOWER, A. *Improvements in or applicable to the keels of navigable ships.* Dated Dec. 2, 1856. (No. 2859.)

The object here is to give vessels a greater hold of the water to enable them to go more readily to windward. It is proposed to increase the width of the base of the keel, so that a channel will be formed on each side of the keel between its lower edge and the garboard streak, by attaching to the vertical sides of the keel pieces of L or angle iron or timber which, in vertical cross section, will present a right angle triangle, or nearly so.

THWAITES, J. H. B. *An improved screw bolt or fastening for ship-building and other purposes.* Dated Dec. 2, 1856. (No. 2860.)

This combines the properties of a nail or bolt and of a screw, being driven into the material by percussion like a nail, and rotating on its axis during its advance like a screw.

NEWTON, W. E. *Improved processes for ornamenting metallic surfaces, and for producing surfaces in intaglio, or in relief for printing purposes.* (A communication.) Dated Dec. 3, 1856. (No. 2872.)

The object here is to reproduce copies of photographic drawings, &c., by obtaining from them, by the action of light and the employment of chemical and galvanic operations, engraved plates, either in intaglio or in relief, upon metals; also to produce damascened designs formed by metals of various colours; also designs formed of different colours, by means of several engraved plates registering one with the other; also designs of different colours, gold and platinum upon porcelain, &c.

LECOCQ, A. *Improvements in hydraulic engines.* Dated Dec. 4, 1856. (No. 2873.)

This consists in an arrangement by which the pressure of the water flowing from a reservoir, and falling down in the buckets of a wheel inclosed on both sides, causes this wheel to turn and carry the water up through a syphon-like canal to another reservoir, whence part of the water may flow, and impart motion to another wheel, which latter, as well as the first, may serve as a prime mover.

BAYER, L. *An improved stuffing to be used in place of hair or other substances in which such articles are commonly employed.* Dated Dec. 4, 1856. (No. 2875.)

This consists in the employment of the fibre of the colonial plantain tree or *musa paradisiaca*, for stuffing articles of furniture.

LIVERMORE, I. *An improvement in waterproofing paper.* Dated Dec. 4, 1856. (No. 2876.)

The inventor employs lac or shellac dissolved in water by the aid of an alkali, and immerses the paper in such solution, and then causes the paper to be dried.

BARNARD, D., and D. LICHTENSTADT. *Improvements in tanning.* Dated Dec. 4, 1856. (No. 2879.)

This consists in the use of ingredients as a substitute for the dog's dung used for softening skins in tanning. The ingredients are nitric acid, 1 part; raw sugar, 12 parts; yeast, 6 parts; and about ¼ of a gallon of water.

HOLLAND, J. S. *Improvements in the manufacture of iron, part of which is applicable to other purposes.* Dated Dec. 4, 1856. (No. 2880.)

The object here is to render iron fibrous. After the iron has been smelted, it is run into a circular cupola, and partakes of rotary motion by forcing into the cupola air or steam through tuyeres at a tangent to a circle drawn within the metal. It further consists in raising the air employed to the full pressure of which one fan is capable, then subjecting it to the action of a second fan, by which its pressure is increased, and then conducting it into the cupola, or it may be subjected to a third fan or more until raised to any desired pressure.

HENSON, W., and H. PALMER. *Improvements in sewing or stitching machines.* Dated Dec. 4, 1856. (No. 2881.)

This consists in the adoption in sewing or stitching machines of moveable plates on which the fabric to be sewn is placed, such plates being arranged in conjunction with needles (horizontal, or perpendicular, or both), and so that any simple compound movement, which may be necessary to produce a given set of stitches, may be obtained merely by properly setting the machine before commencing the work or division of the work in hand.

MARGUERITTE, L. J. F. *Improvements in treating or preparing materials to be used in manufacturing retorts, crucibles, bricks, and other kinds of earthenware.* Dated Dec. 4, 1856. (No. 2883.)

This consists in a mode of increasing in all kinds of clays used for the manufacture

of earthenware the proportions of silica and alumina.

KLŒN, W., and D. JONES. *An improvement or improvements in photography.* Dated Dec. 5, 1856. (No. 2887.)

This consists in the use of photographic plates, formed of materials which present a black surface, which are not brittle, and which have such a chemical composition as not to act prejudicially on the materials employed in taking the picture.

EARP, T. *An improved cutting apparatus for reaping and mowing machines.* Dated Dec. 5, 1856. (No. 2888.)

This consists of a thread shaft or screw, which, on being rotated, cuts against a fixed sickle or sharp edge. The holding fingers are arched at back to correspond to the diameter of the screw, and are formed at the arched parts with cutting edges. All the fingers are united to one common rod. The screw is driven by the onward motion of the implement.

GRANT, A. *Improvements in shirts.* (A communication.) Dated Dec. 5, 1856. (No. 2889.)

This consists in forming the fronts, collars, and wristbands of shirts of quilting, marcella, &c.

CLYBURN, W. *Improved machinery for making butter.* Dated Dec. 5, 1856. (No. 2891.)

This consists in the employment of a rotating agitator or beater, in combination with certain stationary arms, which, being fixed to the vessel containing the cream to be churned, will prevent the latter from being carried round by the rotating agitator or beater.

CLARK, W. S. *Improvements in combined cauldron and furnace for agricultural and other purposes.* (A communication.) Dated Dec. 6, 1856. (No. 2895.)

This invention, so far as relates to the form of the cauldron, consists in giving it an elongated instead of the cup shape generally employed, and so hollowing the bottom lengthwise as to create a furnace fire chamber within the boiler, and to be surrounded by its contents. The arched chamber may be variously constructed; but the inventor prefers to corrugate the greater portion of the surface.

TAYLOR, J. H., and P. MARCUS. *An improvement in irons for ironing.* Dated Dec. 6, 1856. (No. 2899.)

This consists in constructing irons hollow for the reception of fuel, and with a bell-mouthed tube leading into the interior, with a door or flap at back, provided with a damper or valve.

ELLISTON, H. T. *A new or improved method of hanging and closing doors.* Dated Dec. 6, 1856. (No. 2900.)

The inventor fixes on the floor, under that edge of the door on which it is turned, a semicircular tramplate, inclined from each end to the middle, the middle being the lowest point. The door turns on a pin in the centre of the tramway, and on the lower edge of the door is a roller, which rests on the tramway. When the door is opened in either direction, the roller, travelling up the tramway, raises the door, which, by its gravity, tends to return.

LEWSEY, C. J., and G. NASMYTH. *Improvements in the treatment and application of woods used in the construction of casks and such like vessels, and for other purposes.* Dated Dec. 8, 1856. (No. 2903.)

This consists in the use of woods compressed on the edges and other parts intended to be brought into contact, or by placing between the edges or other parts (whether compressed or not) pieces of compressed wood.

COLLIER, G., and E. HEYWOOD. *Improvements in steam boilers or steam generators.* Dated Dec. 8, 1856. (No. 2904.)

This consists in so forming boilers or steam generators that the space for steam may be confined as much as possible to that part which is immediately over the fire space, and that that part of the boiler beyond the fire space is limited as much as possible only to water space.

BERTRAM, J. *Improvements in steam engines.* Dated Dec. 8, 1856. (No. 2907.)

The object here is so to arrange and construct steam engines of the condensing class, that the air pump ordinarily employed for preserving a vacuum in the condenser is dispensed with.

CARLESS, B. *An improved bird cage.* Dated Dec. 8, 1856. (No. 2909.)

This consists in making bird cages of ribs, tubes, or strips of glass instead of wire; or in using a thin wire and stringing glass beads thereon to give it the appearance of the solid material.

HARRIS, J. *A pneumatic signal apparatus, and mode of working the same.* Dated Dec. 9, 1856. (No. 2912.)

This consists of an air pump or centrifugal fan worked from off the axle of a carriage or by hand, whereby air is forced into a chamber; connected with the chamber is a pipe having at the end a whistle, which can be used at pleasure.

LILLIE, J., and A. DOBSON. *Improvements in machinery or apparatus to be used in the processes of drying animal, mineral, and vegetable substances.* Dated Dec. 9, 1856. (No. 2913.)

This consists in placing the substances to be dried in closed vessels, and in forming a partial vacuum by means of an air pump. Dry air is then admitted to complete the drying.

PROVISIONAL PROTECTIONS.

Dated May 11, 1856.

1328. Collinson Hall, of Knavestock, Essex, esquire, and Thomas Charlton, of Brentwood, engineer. Improvements in agricultural engines and implements used therewith for ploughing and cultivating the soil.

Dated May 22, 1857.

1442. Bernhard Samuelson, of Braffords House, near Brough, York, ironmaster. Improvements in safety apparatus for giving artificial light.

Dated June 11, 1857.

1642. Joseph Michell Paule, of Alston, Cumberland, gentleman. Improved means for ventilating coal and other mines.

Dated June 16, 1857.

1682. John Fowler, jun., of Cornhill, and William Worby, of Ipswich, engineers. Improvements in ploughing or tilling land.

Dated June 17, 1857.

1694. James Heywood Whitehead, of Southside, York, esquire. Improvements in pressing cloth.

Dated June 18, 1857.

1706. John Everard Barton, of Kidderminster, carpet manufacturer. An improvement in winding worsted on to creel bobbins of carpet looms.

Dated June 20, 1857.

1728. Benjamin Richardson, of Wordsley glass works, near Stourbridge. Improvements in manufacturing and ornamenting articles of flint glass.

Dated June 22, 1857.

1744. Christopher Dicran Seropyan, of New Haven, U. S. A mode of preparing bank notes, bills of exchange, and other papers, to prevent counterfeiting by photography and its kindred processes.

Dated June 24, 1857.

1764. George Ireland, of Birmingham. Improvements in raising weights, applicable to stamping or cutting metals and other similar purposes.

Dated July 1, 1857.

1836. George Murray, of Glasgow, artist. Improvements in machinery or apparatus for propelling ships and vessels.

Dated July 11, 1857.

1932. William John Thomas Smith, manufacturer, and Frederick Talbot, factor, of Birmingham. An improvement or improvements in hair pins.

1934. John Loach, japanner, and James Jones Salt and Burton Day, manufacturers, all of Birmingham. Certain improvements in metallic air-tight coffins, as also in the mode of covering, finishing, and ornamenting such like coffins.

1936. Peter Armand Le Comte de Fontainemoreau, of Paris. An improved shoe and boot scraper or cleaner. A communication.

Dated July 13, 1857.

1940. Murdoch McKay and Henry Forfar Osman, of Essex-street, Strand. Improvements in apparatus for securing the points of railway switches.

1942. Joseph Lester Hinks, manufacturer, and John Rock Day, machinist, of Birmingham. Improvements in locks and latches, and in attaching lock and latch knobs to spindles.

1944. Peter Rector Smith, of New York, M.D. Improvements in fire arms and ordnance.

1946. William Edward Newton, of Chancery-lane. Improved machinery for converting old rope or cordage into tow. A communication from Messrs. Goulley and Co., of Honfleur.

1948. William Edward Newton, of Chancery-lane. An improved construction of portable railway for steam traction engines on common roads or land. A communication.

Dated July 20, 1857.

1999. Hugh Smith, of Porchester-square, gentleman. An improved agricultural implement for pulverising and cleansing land.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," August* 11*th*, 1857.)

861. C. Martin. Improvements in working signal apparatus on railways.

870. L. E. Deplanque. An improved composition for sharpening and setting fine edged cutting instruments.

885. J. C. Evans. Improvements in railway rolling stock.

897. B. H. Paul. Improvements in the preservation of stone, either natural or artificial, also of cements and other similar compositions.

904. R. Wardell. Certain improvements in reaping machines.

906. H. Smith. Improvements in chaff cutting machines.

909. J. Oliver. Improvements in apparatus for manufacturing and conveying sulphuric acid.

910. R. Martin and J. W. Sutton. Improvements in the means of giving alarm in dwelling-houses and other buildings in cases of robbery, fire, or other emergencies.

916. D. Morrison and S. Lilley. An improvement or improvements in locks.

918. R. Otway. An improvement in scythes.

922. W. Hardman and J. Dugdale. Improvements in machinery for preparing cotton, flax, wool, or other fibrous materials.

927. R. A Brooman. A machine for the manufacture of bolts and rivets. A communication.

928. J. Smith. Improvements in machinery or apparatus used in the manufacture of brushes for flour dressing machines.

932. T. Whitehead. Improvements in spinning flax, tow, and hemp.

939. E. Adler and F. B. Howell. Improvements in machines for cleaning knives and other similar articles.

940. E. Adler and R. P. Abernethy. Improvements in machines for cleaning knives and other similar articles.

944. J. Milnes and F. W. Mowbray. Improvements in lubricating the pistons and valves of steam engines.

951. J. H. Johnson. Improvements in preserving food. A communication.

964. J. Slack. Improvements in lubricating certain parts of looms for weaving.

977. E. Finch. An improvement in railway breaks.

981. F. Piercy and S. Hagg. A portable expanding life and military boat, which is also adapted for other purposes.

985. B. Hingley and S. Hingley. Improvements in anchors.

987. J. B. Sparke and A. Sparke. Improvements in sawing machinery.

998. W. Oxley. Improvements in lubricators.

1000. T. Rolfe. Improvements in pianofortes.

1004. C. F. Bielefeld. Improvements in prepar-

ing the surfaces of slabs or sheets made of fibrous and cementing materials.

1011. J. Beech and J. Williams. An improved mode of securing the rails of railways in their chairs.

1020. H. F. Courenq. Improvements in machinery for ruling paper.

1021. S. D. Lheritier. Certain improvements in signals.

1022. J. B. Robinson. Improvements in machinery or apparatus for effecting agricultural operations. A communication.

1031. J. Gimson. Improved apparatus for preventing the explosion of steam boilers.

1049. P. Wicks and T. G. Ghislin. Superseding the use of bristles, cocoa fibres, flax, hemp, whalebone, &c., to be styled and called an invention for adapting and applying the fibrous plants of South Africa to the purposes of manufacture.

1052. T. Harrison. New or improved machinery for the manufacture of wooden pill boxes, match boxes, and other such like articles.

1056. J. H. Johnson. Improvements in apparatus for generating and super-heating steam. A communication.

1072. J. Sudbury and A. W. Linsell. An improved gas regulator.

1141. G. Welch. Improvements in metallic pens and pen-holders.

1153. W. C. Cambridge. Improvements in chain harrows.

1189. J. Billiard. Improvements in the arrangement and construction of furnaces and other fire-places.

1210. J. H. Johnson. Improvements in apparatus for distilling, applicable also to the extraction of oils, colouring matter, and essences, and to the purification of gums. A communication.

1218. S. Mortimer. Improvements in "screw gill boxes," used in the preparation of wool and other fibrous substances.

1283. W. E. Newton. Improved machinery for manufacturing paper, part of which is applicable to other purposes. A communication.

1503. P. Jossa. Improvements in hammers worked by atmospheric pressure.

1565. G. Deeley. Improved means of preventing the explosion of steam boilers.

1669. J. H. Johnson. Improvements in quadrants, sextants, and other similar instruments. A communication.

1682. J. Fowler, jun., and W. Worby. Improvements in ploughing or tilling land.

1721. E. Kirk, J. Leadbetter, and C. Wilson. Certain improvements in the manufacture of trunks, boxes, and other similar depositories.

1728. B. Richardson. Improvements in manufacturing and ornamenting articles of flint glass.

1818. J. Lawrence. Improvements in apparatus for brewing.

1878. R. J. Badge. Improvements in railway chairs.

1915. W. Johnson. Improvements in capstans. A communication.

1930. J. Chanter and D. Annan. Improvements in furnaces when moveable bars are used.

1956. J. Webster. An improvement or improvements in safety valves.

1983. T. F. Griffiths. An improvement or improvements in shaping metals.

2023. J. J. Bouvert and F. I. J. Pascal. Improvements in smoke-preventing apparatus.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1720. John Cunningham.
1725. George Addison Cox.
1735. Henry Turner.
1748. John Livesey.
1750. William Houghton Clabburn.
1755. Peniston Grosvenor Greville.
1766. John Petrie, jun.
1775. John Greaves and Charles Michael Greaves.
1807. John Pretty Clarke.
1817. Edward Lund.
1832. Robert Brisco and Peter Swires Horsman.
1947. Joseph Westwood and Robert Baillie.

LIST OF SEALED PATENTS.

Sealed August 7, 1857.

368. Henry Cartwright.
377. William Thomas Walker.
381. Benjamin Webster Owrid.
382. Joseph Graham, James Shepherd, and Thomas Whitaker.
385. Austin Chambers and William Harrison Champion.
386. George Bedson.
392. Abraham Royds and John Kenyon.
400. William and Jacob Todd.
402. Richard Dugdale Kay.
404. John Macintosh.
406. George Chappell Potts.
419. George Gimson.
472. Jacob Green.
476. Julien Blanc.
543. John Henry Johnson.
549. James Fenton.
556. John Henry Johnson.
570. Victor Cassaignes.
575. William Robertson, James Guthrie Orchard, and John Menzies.
626. William Edward Newton.
847. Domenico Tomasini.
1042. Richard Archibald Brooman.
1053. Richard Archibald Brooman.
1272. Henry Elliott Hoole.
1286. Peter Armand Lecomte de Fontainemoreau.
1404. Edward Alfred Cowper.
1446. John Turner Wright and Edwin Payton Wright.

Sealed August 11, 1857.

398. John Talbot Pitman.
403. John Poole.
424. William Richardson.
426. D. A. Lamb.
430. Marmaduke William Hallett.
442. Archibald Smith.
443. James Taylor.
450. Thomas Newcomb.
455. William Clark.
456. Thomas Ball.
463. Emile Alcan.
499. John Combe.
509. Francis Hay Thomson.
531. Jacques Henri Marie Maissiat.
561. Thomas George Shaw.
566. Charles Bruton, sen., Charles Bruton, jun., Francis James Bruton, and Samuel Rogers Bruton.
568. William Mills.
636. William Edward Newton.

639. George Walter Dyson.
680. James Andrew Cumine and Colin Hunter.
688. William Edward Newton.
1320. Charles William Siemens.
1528. Dr. Hermann Bleibtreu.
1578. Robert Hanham Collyer.
1598. Amory Fairbanks Sherman.
1602. John Brown.
1658. Thomas Turner.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

Nauticus.—Thanks for your letter, which shall be considered.

C. Burcham.—Your letter is in type, and shall shortly appear.

P. H., Isleworth.—Webbed gloves and other analogous contrivances for aiding in swimming have been patented by Mr. Cox, of the Gorgie-mills, Edinburgh, and therefore your suggestion comes too late.

J. L.—You are welcome to admire such fanatics if you please; we hate them.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1775.] SATURDAY, AUGUST 22, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

MACKWORTH'S PATENT COAL PURIFIER.

MACKWORTH'S PATENT COAL PURIFIER.

COAL, as it is obtained from the mine, is well known to be mixed with schist, shale, pyrites and other substances of greater specific gravities than the coal itself. The small coal which is sent out of mines necessarily contains a still larger proportion, frequently exceeding 10 per cent. The pyrites, which contains nearly the whole of the sulphur found in coal seams, is very injurious in heating and smelting furnaces, in the manufacture and working of iron, in gas-making, in coking, and in other processes. So deleterious are the impurities of coal, that many seams of this material already sunk to, and portions of seams in work, are left underground as unsaleable because of them. Small coal sells at a low price, chiefly in consequence of its impurities, and its defective coking property thereby occasioned. It has been estimated that the quantity of coal sacrificed in producing a commercial article of proper quality and description is nearly as great as the quantity sold. It is very desirable therefore that some expeditious and economical means should be employed for separating coal from its impurities, these means being evidently applicable to the separation of other substances of different specific gravities.

There have been many forms of apparatus devised for the purpose, their objects usually being, first to crush the larger portions of the minerals operated upon, then to arrange them into lots or groups according to their sizes by means of sieves, and finally to separate the various component substances from each other by means of water, through which they are allowed to fall, or which is made to rise and fall through them. We propose, however, in the present article, to confine our remarks to the latter process only—the separation of the mineral substances by means of fluids in motion.

In order to get rid of the defects of the existing apparatuses, Mr. Herbert Mackworth, of Clifton, Government Inspector of Mines, has patented and brought into operation the apparatus represented in the annexed engravings. In this apparatus the "jigging" or up and down motion of the water is done away with, and a slow continuous upward current of water is used to separate the coal from the heavier substances. Fig. 1 of the annexed engravings is a side elevation; fig. 2 is a plan, and fig. 3 is a transverse section of one form of the new apparatus. The crushed coal is supplied to a feeding hopper, A, from which it is carried up by an endless belt, B, which allows it to fall into a revolving hopper, C, which is carried round by an upright shaft. From the hopper, C, it falls into the separator, D, through which a gentle continuous current of water is forced upward by a screw, E, driven by a belt on a driving pulley, F. As the crushed coal falls into the separator, D, the rising water tends to resist its downward motion, and is so regulated in velocity, that while the shale, schist, pyrites, &c., fall slowly to the bottom, the coal, being lighter, remains at the top, whilst the water passes and drains away through the inclined and perforated plate, J. The curved sweep, G, which is connected to the upright shaft, in passing round over this surface, J, pushes and raises the coal upward clear of the water, until the coal falls over the lip, I, into the shoot or gutter, H, down which it descends into wagons or other receptacles. The water which falls through the perforations of the surface, J, passes down to the screw and is again and again forced up without intermission through the separator. The shale is allowed to fall from the separator, D, through the apertures, K, into the compartment, L. From the compartment, L, it is afterwards allowed to pass through the valve, M, into a wagon. Before opening the valve, M, the apertures, K, are closed by turning the lever, N. The screw, E, is driven by a belt, P, passing round the wheel, O, which is driven by means of a pinion, and a toothed wheel on the shaft of the upper roller of the belt, B. Of course the modes of raising the coal, of forcing the water upward, &c., may be varied, the essential features of the apparatus being retained.

We might readily exhibit the advantages of this apparatus, but we prefer to give part of the patentee's own summing up of them, which is as follows:—"1st. The more perfect separation of the impurities. If the coal is not sufficiently crushed, even the fragments of coal containing shale or pyrites can be separated as well as the shale, by regulating the velocity of the water. By increasing the speed of the machine and the velocity of the water, the separation of the impurities may be limited to any extent desired. 2nd. The saving of coal. This may be estimated at from 6d. to 1s. 6d. per ton. The ordinary washing processes sacrifice more than 20 per cent. in weight, of which more than one-half is

the best coal. In this machine the water does not pass out, but is used over and over again in a continuously circulating stream. The loss of coal does not exceed 2 per cent., and is generally under 1 per cent. 3rd. The economy in the power required to work the machine. One horse-power will suffice to work a machine with pump and elevator capable of purifying 80 tons of coal per day. 4th. The saving of manual labour. The ordinary contract price for jigging coal is 3½d. per ton. The cost, by the patent purifier, will

Fig. 3.

vary from 1d. to 2d. per ton, according to the size of the machine. 5th. The quantity of water required is comparatively insignificant. A small supply of water is required to replace that absorbed by the wetting of the shale and coal. 6th. The coal is delivered drier than by any other existing process. 7th. The largest machine stands in an area of 9 feet square, and motion can be given off any existing engine by a strap to a pulley making 40 revolutions per minute, at a height of about 12 feet above the ground. The height given to the machine is for the purpose of passing trams underneath it to receive the purified coal and shale as they are delivered. The machine requires no foundation, and is easily removable."

A Few Remarks on the Science of Gunnery. By Capt. T. A. Blakely, R.A. Second Edition. London: James Ridgway, Piccadilly. 1857.

This little *brochure*, containing three chapters, emanates from a captain of the Royal Artillery, who very justly considers that the science of gunnery—implying in this term chiefly the science of the art of constructing guns—has not made much progress of late years. This he attributes to the nature and slowness of promotion in the Royal Artillery, every officer, when once admitted into the corps, necessarily rising through the successive steps in turn, and, whatever merit he may possess, having to wait until he attains the mature age of forty before he can emerge from the dead level of the captain's rank, and having in the mean time to submit to the commands of men who are, in comparison with himself, mere boys, but, being infantry or cavalry officers, have had the good fortune to rise more rapidly. This state of things is, no doubt, a hardship and a grievance; but it is too much to say that the slow progress of the science of gunnery is due entirely, or even mainly to this cause. There are inherent difficulties in the subject to which, in our opinion, a very considerable share of the causes of the want of progress complained of must be attributed. Amongst the foremost of these difficulties is the general uncertainty with regard to the nature of gunpowder and its action when exploded. Private persons have seldom the means of carrying on experiments on gunpowder with effect, and those made by Government are, perhaps necessarily, confined to the service. "Captain Boxer," it seems, "has cleared away nearly all the false impressions on the subject; *but his book is not in the hands of the public.*"

From France we have to derive, as usual, all that is known authentically on this subject. M. Piobert has made experiments on gunpowder, and Captain Blakely, in the little work before us, undertakes to interpret these for the public.

The main object of M. Piobert in the experiments in question seems to have been to ascertain the effect of *length* of gun on the velocity communicated to a ball on leaving a cannon's mouth.

For this purpose a series of guns of two-thirds of an inch bore, of length varying from four to sixty-four calibres, were used, the charge of powder and the weight of ball viz., ·06 lbs., being the same in all cases. Captain Blakely, adopting these experiments as his basis, applies them to the consideration of the relative strength of a gun at different portions of its length.

In the table of M. Piobert's experiments we have only four columns—the first exhibiting the length of the gun in calibres, the second the same in absolute length, the third the space passed over by the shot, and the fourth the total velocity acquired. Captain Blakely's further deductions exhibit eleven more columns showing—(1.) The velocities added in passing from one length of gun to that immediately succeeding. (2.) Spaces through which these velocities are added, being merely the differences of the spaces passed through successively by the shot. (3.) The times in which these velocities are added, calculated on the supposition that the pressure is uniform during these short spaces. (4.) The total times; which are obtained by adding the times through the successive small spaces. (9.) The uniform pressure which must be applied to the shot to generate in it the added velocities. (10.) The pressure of gas to move itself. (11.) Mean resistance from the air in front, and friction, which are supposed to be equal to four times the resistance to the shot moving with the same velocity through the air freely. (12.) The total pressure per square inch calculated from the former pressures. (13.) The number expressing the ratio of space occupied by the gas to space occupied by cartridge. (14.) Pressure of gas if compressed into space occupied by the cartridge; and (15.) The proportion of powder burnt, supposing it, when fully burnt, to occupy 3,000 times the space of the cartridge.

All these columns are very fairly deduced on scientific principles with which no fault can be found; and we think the conclusions at which they point to be reliable, and of great importance in the science and art of gun manufacture. Thus it appears that in a gun of two-thirds of an inch bore and 49 calibres length, "the pressure varies gradually from about 250 to 120 atmospheres at the end of the barrel." Whence the author concludes that the thickness of the metal should vary gradually also. The probability, however, is that the large gun has to sustain at the commencement a considerably larger pressure than the short gun; hence the strength at the breach ought to be much greater than the above numbers would indicate.

This principle of constructing guns of great strength at the breech, and of continually diminishing strength towards the muzzle, has been adopted by the American Government, as our readers who saw or read our description of the guns on board the U. S. steam-frigate *Merrimac* will recollect.

Captain Blakely very properly remarks that the thickness of the metal may diminish in a higher ratio than the pressure, and his second chapter is devoted to a proof that this is scientifically true.

The mathematical investigation in this chapter is not very satisfactory, omitting all consideration of the effect of the normal pressures; the results are, therefore, by no means to be relied on. Our readers will recollect that, in reviewing Mr. Mallet's work on gun-founding, we had occasion frequently to exhibit the true relations between the pressure, tension, and dimensions of the gun. With this investigation Captain Blakely is apparently unacquainted. We will again state the results in connection with their bearing on the present inquiry.

If P be the total pressure from the explosion of the powder at the inside of the gun, a the inner and R the outer radii, p the pressure at distance r, and t the corresponding tension, then

$$p=\frac{P}{r}\,\frac{R^2-r^2}{R^2-a^2}\ldots\ldots\ldots(1)$$

$$t=-\frac{dp}{dr}=\frac{P}{r}\,\frac{R^2+r^2}{R^2-a^2}\ldots\ldots\ldots(2.)$$

Now if T be the tension at the inner surface,

$$T=\frac{P}{a^2}\,\frac{R^2+a^2}{R^2-a^2}.$$

The greatest tension is at the interior surface, and T^1 be the greatest which the gun can safely bear, then

$$T^1=\frac{P}{a^2}\,\frac{R^2+a^2}{R^2-a^2};$$

or solving with regard to R,

$$R=a\sqrt{\frac{a^2\,T^1+\frac{P}{a^2}}{a^2\,T^1-\frac{P}{a^2}}}$$

and no advantage can be gained by increasing R beyond this value.

Also supposing P to have the several values corresponding to the different spaces occupied by the gas in the gun before the shot finally leaves; or, in other words, if P_l be the pressure when the gas occupies the space l and R_l, the corresponding external radius a remaining constant,

$$R_l=a\sqrt{\frac{T^1+\frac{P_l}{a^2}}{T-\frac{P_l}{a^2}}}$$

gives the proper value for R_l at this part of the gun.

The third chapter has for its object the description of the method proposed by Captain Blakely for strengthening guns, viz., "*replacing the outside metal, which is now nearly useless, by metal put on so that, when at rest, it shall have already a tension upon it, and shall compress the interior*, SO THAT AT THE MOMENT OF FIRING THE GREATEST POSSIBLE PROPORTION OF THE THICKNESS OF METAL MAY BE NEARLY EQUALLY STRAINED."

The means of attaining this object is by diminishing the dimensions of the cast-iron gun, and shrinking over it rings at such temperatures that, when cool, they shall grasp the inner tube with pressures proper for the purpose. Our readers will observe that this method is identical with that proposed by Mr. Mallet in his work, which we formerly reviewed. Captain Blakely will, therefore, see that he has been forestalled, at least as far as priority of publication goes, in his recommendations. He is apparently unacquainted with Mr. Mallet's work, and his conclusion may be considered as an independent authority in favour of the mode of construction advocated.

On the whole, Captain Blakely's little pamphlet is a highly creditable performance. His general treatment of the subject is approached in a philosophical spirit, and handled on sound scientific principles; and we trust that his efforts to obtain a favourable hearing—hitherto, it seems, denied him—will be crowned with that success which the importance of the subject and the soundness of his conclusions fairly warrant.

FURTHER CONSIDERATIONS ON HEAT AND OTHER IMPONDERABLES.—BY HORATIO PRATER, ESQ.

(*Continued from page* 102.)

Having now, I think, shown that there is a sympathetic power* (so to call it) in inanimate matter, I do not see that we are OBLIGED to infer that in electrical induction the motion is communicated by all the *intervening* atoms becoming polarized, and thus transmitting the effect, as I see is now the prevailing theory after Matteucci's experiment of inserting numerous plates of mica between two metallic discs, one of which, on being electrified, communicates an electric state to the other, just as in the case of the Leyden jar. When these plates of mica are separated by insulating handles, *each* plate is differently electrified, one side of it being

* The *new* facts just now adduced in support of such a property of matter, merely come to the support of Arago's experiment, and the fermentative and putrefactive *motions* producing their like, noticed at the beginning of my essay published last year. (*Mech. Mag.*, Sept., 1856.)

positive and the other negative. (De la Rive's *Electricité*, vol. i., p. 140)*

Neither is this idea of sympathy in the communication of electricity or heat unfavourable either to the ether or the mere motion theory of electricity, or heat. Indeed, though one of the leaders of the last theory seemed to think that if there was, or could be, *a void* in any part of nature, his theory must fall, I cannot adopt this view after having shown that matter (that is, the imponderables in it), by a sympathetic power, can act where it is not. Indeed, I will *go further*, and think those who support the motion theory of heat can only do so *in a powerful way* by subscribing to this new doctrine; for they cannot get over the fact that heat causes repulsion in the *best void* (nearly perfect) we can make.

I shall, however, continue to support the ether theory of heat; for though I do not think that this *wants* the new sympathetic view just stated, yet I see nothing in such view that *opposes* the ether theory. Newton, indeed, seemed to think that the ether doctrine assisted us in conceiving how, in gravitation, matter could act where it was not; and so he might have said of heat. I must, however, beg to differ from this great name on such points; for as we do not absolutely want *ethers* to explain how the *mere presence* of one living being affects all the views and ideas of another, so we do not want ethers to make gravitation and heat act ONLY BY absolute contact of atoms.† I must, indeed, on *my view*, think that heat so acts; but those who conceive heat to be only motion, need not.

When the rays of a hot sun fall on the window, we find the heat *in* the room nearly the same as that outside the window, *while the glass itself feels comparatively cool;* and though, in every experiment, I found the thermometer rose actually higher in the room under a May Italian sun, yet as this was probably due to the very slight currents of air *outside* the window, keeping down the heat a little, I have used the words "nearly the same," in order rather to be on the right side than the opposite.*

This result, as regards heat, only differs from that of electrical induction just alluded to, in there being, as far as we yet know, no difference in the *kinds* of heat outside and inside of the window; for the glass may be regarded as *a sort* of insulator, in as far as *it seems to remain cool.* But although I admit that this is still not perfectly analogous (as Matteucci's experiments show the intervening substance is polarized), yet it is sufficiently analogous for very general application. Here again, then, it may be, that *heat acts where it is not* (for certainly not to the hand does it seem sensible in the glass); yet we find it there on the opposite side of the glass.

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* It appears also that by this effect of induction (viz., approximating an electrified to a *non-electrified* conductor, and thus causing the nearest parts of such conductor to be oppositely electrified) the states are more exalted when sulphur, than when shellac is used *between;* and more when shellac than when glass is used, probably in consequence of a difference in insulating effect of these substances. But notwithstanding Matteucci's experiment, I think I have almost as much right to say the *electricity acts where it is not*, by a power analogous to sympathy, for it does NOT PASS THROUGH the sulphur, &c. Besides, Sir W. Snow Harris shows that induction acts the same *in vacuo*. (*Phil. Trans.*, 1834)

† Probably my readers will find these passages obscure. I shall therefore state, that I believe in the existence of an ether not only from the phenomena of heat, electricity, &c., but also on account of the phenomena of sound. (See my two essays on this subject.) But, then, such being the case, you cannot, it may be said, believe that matter can act where it is not. No, certainly, I cannot, or do not, if I believe the ether also to be matter, which I do, though in a *very* attenuated state, and thus very different from common matter, and might be called its soul. But my remarks only apply to *ponderable and visible* matter; and I do not at present pretend to decide whether this, when it produces *sympathy* in other matter, acts by means of the intervening ether or not; as, for instance, in that *obvious* sympathy, in which the mere presence of one living person of the same species affects another of the same species. I trust this is intelligible.

* I have since made more accurate experiments as regards the temperature of the window itself, and find this was actually higher than the temperature of the air *inside* the room, *very near* to the window; for when the thermometer was placed *in contact* with the window, which *felt so cool*, it rose to 86°, but in the air near it only to 82°! But as the glass certainly *feels* so cool, I have thought it as well to let the above observations remain; this being, I think, very remarkable, since we know that glass put in hot water becomes ITSELF hot; more especially, also, since after Mr. Elisha Foote's remarkable essay *On the Heat of the Sun's Rays*, read before the American Scientific Congress (*Silliman's Journal*, Nov., 1856), it seems to me the whole of this part of the subject of heat wants clearing up; and though this discovery of the *real* temperature of the window itself makes this, perhaps, not an apt illustration of my theory of "heat being able to act (by sympathy) where it is not," yet the observation may be useful for other experimentalists.

Mr. Foote says, "The sun's rays in passing into a heated room acquire a temperature which they do not derive from the sun." Again, "Heat is modified according to the temperature of the place that the sun's rays illumine." He gives some tables of experiments in support of this view; which, if confirmed (he says he is still going on with experiments), will be one of the greatest discoveries in modern times, and I think will amply support the theory of *heat being able to generate itself*, which appears in my essay of last Sept.; for, according to Foote, when the sun's rays meet heat in a room, they tend to INCREASE this heat in a very great degree. It is a sort of "*conversion*," according to Foote's view; for he seems to think it is the *light* of the sun falling on artificial heat that generates this *extra* heat, and says, "No heat travels with the sun's light." For the present, I must beg to differ somewhat from this, and thus to regard the effect rather akin to generation than

I have said "may be," for until our mechanics have discovered for us the mode of getting a perfect void, we cannot hope to get beyond probability on the subject; and, of course, it may always be said that the *ethereal* matter of heat has passed *through* the glass. Yet, in opposition again, it may be asked, why then does this not feel heated to the same extent by the air inside? If glass really *conducted* the heat, surely it ought to be so, as we find good conductors of heat (as the metals) are always *themselves heated* when heat passes through them. But as when a piece of glass is put in a hot fluid, the heat scarcely moves beyond the part of the glass *immersed*, glass seems correctly called a bad conductor of heat, and the great authority on this point, Melloni, has put it down as such; yet, with due consideration, it seems to me that this experiment in regard to the passage of the sun's rays through *a plate of glass* wants further attention in reference to the non-conducting or little conducting power of glass. I shall notice the point again, when I review Mr. Foote's essay more in detail than I could do in a note.

The loose way in which the conversion theory is got up (by men, too, who are called, or call themselves, the first philosophers of the age, but some even of Aristotle's dogmas in physics fell AT LAST) is nowhere, perhaps, more clearly seen than in its principal so-called proof, of "the conversion of chemical into electrical force," to use our author's own dogmatic words. Gold leaf in this experiment (for details and comments on it, the reader is referred to my two Memoirs on the subject in the *Proceedings of the Electrical Society*, 1842-3, is *seemingly* made to dissolve in muriatic acid; but it in reality only dissolves (as I there show) in such acid, when the *composition of this is changed by* the electric current. It is, then, only a case of common chemical affinity. I have looked in vain for any *new experiments* on this subject since 1843, in our author's large volume on Physical Forces, published by Messrs. Longman, in 1855, and find this experiment is alone alluded to. So that hundreds more of experiments are wanting before sound logic can admit that chemical force has been *converted* into electrical, or *vice versâ*. In fact, those who are contented with such proof on the subject, are yet obliged (in their own words) to admit (and that, too, so late as 1855!) that "*when an electric current is passing through a metallic wire, this is not altered in its chemical affinity as far as we yet know.*" But why not, if electrical force can really *directly* alter or "convert" chemical force? That it *indirectly* alters it (heat or even *cold* can do the same, though probably not to the same extent), I have admitted in my Essays above referred to: but this is quite a different point.

When a thin platinum wire joins the poles of the voltaic battery, the wire is ignited. But if this wire so placed be now immersed in cold water, the chemical action of the battery will be *increased*, more zinc being dissolved and hydrogen eliminated in the same time in consequence of the connecting wire being cooled. And if the wire is kept in the flame of a spirit lamp, the chemical action of the battery becomes *less*. Now is the platinum wire heated, by the "conversion" of electricity into heat? for whether the wire be placed in one medium or another (our authors have tried different gases and liquids), the chemical action is always proportioned to the facility with which the heat passes, or is obstructed, by such media.

If the electricity actually become heat, we should expect that the chemical action (the generator of electricity) in the battery would be greater in proportion as we removed the heat from the platinum wire, and so it appears to be. But this one experiment is not sufficient to prove the point, and the advocates for "conversion" seem to perceive this, for they only talk about a "reciprocity of action" that is, use *ambiguous* language, in the case; and all along go on the principle that heat cannot increase or generate itself (in the way, for instance, that life does), not "out of nothing," but "without antecedent force," for our authors confound these too. Heat in spreading as flame, does not increase "out of nothing" (but out *of matter*—like life) but *without other antecedent force than itself*, and perhaps what can scarcely be called this.

One way of attempting to explain the heating of the wire is, that first of all its particles *oppose the progress* of the electricity, producing thereby heat; and then that this heat stops the progress of the electricity, and thus by obstructing this, stops the chemical action producing it, by a force running (as it were) backwards. There is no

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conversion; but shall wait for the completion of his valuable labours, fully satisfied, *from the great cold on high mountains even in the hottest summer* (witness the Andes or Alps), that the *atmosphere*, has by its heat (Foote), or in some way or other, a marvellous influence on what is now called the *sun's* heat.

Perhaps the fact above stated, viz., that glass put in hot liquids (water) becomes *itself hot*, but left in the sun's rays (at least placed at the angle at which a window is placed) does not become so, supports Mr. Foote's theory of there being little heat in the sun's rays, or, at all events, of the heat of these *being of a totally different character from terrestrial heat.*

actual *necessity* here, then, for supposing the electricity to be "converted" into heat.*

(*To be continued.*)

A NEW DECIMAL SYSTEM.

To the Editors of the Mechanics' Magazine.

Gentlemen,—When I had the honour of addressing you on a former occasion, I mentioned in favourable terms the sixteenth of an inch as a basis for a decimal system. At that time, I was afraid that the bushel derived from it would be found too large. I have lately been in communication with several intelligent corn meters, and I find that a bushel a little larger than our present one would be an improvement. An imperial bushel of wheat averages 60 lbs., making the sack, of three bushels, 180 lbs. A sack of coals in London weighs 224 lbs. It has often to be carried a considerable distance to be delivered at the back door of a house in the middle of a long row, and coals do not "pad" so well to a man's back as corn or flour. A sack of flour weighs 280 lbs. If a sack of corn weighs 200 lbs., corn porters would carry as much in eighteen journeys as they do now in twenty. A bushel derived from the sixteenth would be to the imperial bushel as 1·10063 to 1, making the sack 198 lbs. The majority think that this would be an improvement; some think there would be no objection to it; one weak-looking old man thought the bushel was quite heavy enough at present.

My objection to the bushel being removed, I have carefully reviewed the "sixteenth" system, and find that it contains so many excellent qualities, that I have made up my mind to recommend it as preferable to all others.

I am not aware of the existence of a thorough decimal system in any part of the world. The French franc, the unit of money is five grammes of silver; had it contained 10 grs., or a decagramme, the system would have been completely decimal, the only thing that could have been said in its favour. Chemistry has decided against a decimal alloy of gold for coinage. Sir John Herschel says, to the Committee of the House of Commons, "It is considered as a recognised fact that $\frac{11}{12}$ is the hardest composition."

Leaving unaltered our present alloy of gold coin, and using the temperature 16° centigrade, instead of $16\frac{2}{3}$°, I propose to build up a system of measures of length, surface, bulk, weight, work, power, and money, on the sixteenth of an inch as the basis of the whole. The measures of length are to be all decimal multiples of the sixteenth of the present inch, pure and simple; the measures of surface to be decimal multiples of the squares of the measures of length; the measures of bulk to be decimal multiples of the cubes of the measures of length; the weights to be equal to the measures of bulk filled with water, and the unit of money to be exactly the weight in gold of a measure of weight.

Here then we have a system perfectly decimal in its entire construction, with the exception of its composition of coinage metal, and I make bold to say that the inception of it would require a less amount of change, and be effected more easily than any other system that could be proposed. Not only is it well adapted for England, her colonies, and the United States of America, but it would also be more acceptable to the continental states than any other, particularly to the French, to whom it would afford an excellent opportunity of abandoning their present impracticable system.

To prevent the ledger-keeping reader from taking alarm, I may state at once that the only alteration in the gold coinage will be to increase the weight of each piece by multiplying it by 1·00003684, making a sovereign heavier by less than the $\frac{1}{240}$ of a troy grain.

If a system of lineal measures will suit mechanical engineers and machinists, it cannot be far out for other artizans, and no basis can be better for them than the sixteenth of an inch, for all the measures they use are made up of sixteenths, and there are millions of things measured by the odd sixteenth of an inch. If we write down the word si*xteenth*, and cross out the letters in italics, we shall have the word "steen," which will serve for a name until we get a better. We can now compare the merits of the systems that have been proposed; and for this purpose, we may take the dimensions of screw-bolts, and nuts, in the inch system proposed by General Pasley; in the foot system proposed by Mr. Tate; in the metrical system proposed by Mr. Yates; and in "steens."

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* Since the above was written, I see that M. Becquerel also says, "When electricity circulates in a wire, the greater the heat produced the less the quantity of electricity passed, and *vice versâ*;" and also "when we collect the heat produced in a closed circuit of zinc and copper, we find this greater the less the electricity passing in the wire, and *vice versâ*." (*Comptes Rendus*, Dec. 15, 1856.) But he is properly cautious about asserting absolute conversion, and says the same results obtain, *as if* conversion had taken place. Mr. Joule, also, speaks with great reserve, and says, "The heat produced by *any pair* is proportioned to the intensity of the current, and the number of atoms electrolysed in it" (*Phil. Mag.*, Oct., 1856); that is, the *rapidity* of the current causes the heat by, as we may conceive, a sort of *friction* against the atoms of matter. At all events, in his controversial papers for the last six months, I do not see that he adopts the view of the conversion of electricity into heat.

Synoptical Table, showing the dimensions of bolts and nuts in present measures, in decimals of an inch, in decimals of a foot, in the French metrical system, and in "Steens," or sixteenths of the present inch.

Present Measures.	Inch Decimalised.	Foot Decimalised.	French Metre.	"Steens."
Inches.	Tenths of an inch.	Hundredths of a Foot.	Millimetres.	Steens.
$\frac{3}{16}$	1·875	1·5625	4·76241	3
$\frac{1}{4}$	2·5	2·0833	6·34989	4
$\frac{5}{16}$	3·125	2·604167	7·93736	5
$\frac{3}{8}$	3·75	3·125	9·52483	6
$\frac{7}{16}$	4·375	3·64583	11·11230	7
$\frac{1}{2}$	5·	4·16667	12 69977	8
$\frac{5}{8}$	6·25	5·20833	15·87471	10
$\frac{3}{4}$	7·5	6·25	19·52483	12
$\frac{7}{8}$	8·75	7·291667	22·22460	14
1	10·	8·333	25·39954	16
$1\frac{1}{8}$	11·25	9·375	28·57448	18
$1\frac{1}{4}$	12·5	10·4167	31·74943	20
$1\frac{3}{8}$	13·75	11·4583	34·92437	22
$1\frac{1}{2}$	15·	12·5	38·09931	24
$1\frac{5}{8}$	16·25	13·5416	44·27425	26
$1\frac{3}{4}$	17·5	14·5833	44·44920	28
$1\frac{7}{8}$	18·75	15·625	47·62414	30
2	20·	16·667	50 79908	32

A mere glance at the above table will satisfy any one of the superiority of the measurement by "steens." Besides, you cannot build a decimal system on an inch, or a foot, that would be worthy the slightest consideration. 200 steens would equal 12½ inches, an admirable length for a mechanic's rule. 10-ins. for such a purpose would never do. You must give the mechanic as long a ruler, straight edge, and measure as he can conveniently carry in his rule-pocket. The decimal chain for measuring land would be 52 feet, or 0·789 Gunter's chain; the mile would be 1,736 yards, or 0·986 old mile. The degree would contain 69·9988608 of these miles. French metres would be easily turned into the new measures, as one metre would equal 62·9933 new inches.

The new measures would suit the building trade admirably. Builders now use a lath or baton, 5 feet long; the new fathom would be 5 feet 2½ inches; and fortunately, as well as singularly, 10 square fathoms would give 0·9973 of the present rod of brickwork. A perfectly decimal lath, only 2½ inches longer than the old one, and no division by 272, as at present, would be a boon to the builder and architect. Such a measure would also equal 0·9964 of the present land perch. The square chain would equal 9·964 perches, 0·2491 roods, 2·5201 French arcs, 0·9989 German morgans, taking the mean of six German states. The square fathom would also equal 3·01 square yards, an easy number for conversion. The new lineal measures are also well adapted for the builder. Take the following dimensions of a common stock brick.

Length 8¾ ins.=8·75 ins.=14 ins. new.
Breadth 4¼ ins.=4·25 ins.=6·8 ins. new.
Thickness 2½ ins.=2·5 ins.= 4 ins. new.

I have already shown how well the new bushel will suit, as a bushel; the number is also good for conversion. Its equal, the new firkin, will also suit brewers, being 0·97884 old firkin; the new gallon will equal 4·0005311 French litres. For every pound the present bushel weighs, the new bushel will weigh 1·249914 new lbs. or 1¼ lbs. The new dram or weight of the new cubic inch of water, will be 1·027 drachms; the new ounce=1·4089 avoir. ozs., and 9 ozs. troy=7·008 new ozs. The new stone will=1·0070 stones of 8 lbs.—a good number for butchers. The drachm will also= 3·994176 French grammes; and, what is much better, the weight of the present half-sovereign multiplied by 1·00008684, so that by making the half-sovereign so much heavier we shall have standard gold £10 per oz. I propose to make this a cardinal denomination of money, to be called a ducat, or any other name. Then the figures which express the weight of a piece of standard gold will also express its value. The money table will then be 4 farthings, or 2 halfpence, 1 penny; 10 pence 1 shilling; 10 shillings 1 ducat; and, if you choose, for large sums, 10 ducats 1 oz., or 1 victoria. This would enable us to get rid of that horrid mil with

which we are threatened, and which would get into every till, and every pocket, and we should have the richest nation in the world using the smallest coin in the world for general use. We should also be freed from that other abomination, with which we are threatened—the liliputian silver cent, which must not be made in the form of a ring, which could not be made with a copper rim round it, which no one would tolerate if made larger by debasement, as farmers tie a cow's horn to the stable-door key to prevent its being lost. (Of this matter more by-and-by, by your leave.) The Post-office difficulty would be got over, inasmuch as the new ounce being so much larger than the present ounce, we should be able to send a heavier letter or newspaper, for the new penny; so that the Post-office would gain on the light letters, and the public would oftener escape double, triple, &c., postage. The quarter ounce to France would be just a decagramme, or decimal weight; 4 new pence for a new ¼ oz. would enable us to send a letter written on paper that would not admit of the letter being read without opening it.

I am, Gentlemen, yours, &c.,

J. Simon Holland.

THE ATLANTIC TELEGRAPH CABLE.

Mr. Cyrus Field arrived in London on Saturday, and made the following official report to his co-directors:

"Her Majesty's ship *Leopard*, Captain Wainwright, arrived at Portsmouth on Friday evening, and reports that the Atlantic telegraph cable was lost at a quarter before four o'clock on Tuesday morning, after having paid out successfully 335 nautical miles of cable, and the last 100 miles of it in water over two miles in depth, and the greater part of this at a rate of rather more than five knots an hour. At the time the accident occurred there was a heavy swell on. The *Niagara* was going at the rate of four knots an hour, and as the engineer found the cable was running out in too great proportion to the speed of the ship, he considered it necessary to direct the breaks to be applied more firmly, and unfortunately the cable parted at some distance from the stern of the ship. The *Agamemnon*, *Niagara*, and *Susquehannah* are to remain a short time where the cable parted, to try some experiments on the depth of water of that part of the Atlantic, of 2,000 fathoms, which it is considered will be of great advantage to the company, and then all the vessels go on to Portsmouth. The *Cyclops* was sent back with despatches to Valentia, and she was then to join the *Leopard* at Plymouth. Although this unfortunate accident will postpone the completion of this great undertaking for a short time, the result of the experiment has been to convince all that took part in it of the entire practicability of the undertaking; for, with some slight alteration in the paying-out machinery, there appears to be no great difficulty in laying down the cable. It has been clearly proved that you can successfully telegraph through 2,500 miles of telegraph cable, and that its submergence at a great depth had no perceptible influence on the electric current. There is no practical obstruction to laying it down at the rate of five miles per hour in the greatest depth of water that there is in the telegraphic plateau between Ireland and Newfoundland. The experience now obtained must be of great value to the company, and it is understood that the directors of the company will decide whether it is best to have more cable made and try again immediately after the equinoctial gales are over, or wait until another summer."

THE IMPROVED BUOY OFF SOUTHSEA CASTLE.

Many of our readers who have visited Portsmouth during the past four or five years may have observed off Southsea Castle an unusually tall buoy, and many a landsman may have wondered what it was for, and have wished to learn all about it. The buoy in question is situated on the end of a sand called the Spit, forming one side of the narrow channel leading into Portsmouth Harbour, and is the invention of Captain George Peacock, who was for many years the Superintendent of the Southampton Docks, and formerly a master in the Royal Navy. The object of the intelligent inventor was to construct a buoy which should be more elevated above the water than the ordinary description of buoys, and which should also serve as a refuge for castaway seamen, and carry an alarm bell for fogs on dark nights. Upon an iron float, ingeniously constructed to resist the force of the waves and currents, and to facilitate the mooring of the buoy, he raises a conical structure, formed of iron bars well secured together with cross beams, at the top of which, inside, a bell is suspended, having four clappers outside, which, upon every roll of the buoy, strike the bell. Surmounting the whole is a prismatic mirror, which is intended to reflect the sun's rays, and so attract attention during certain states of the atmosphere, when it is often difficult to discover objects at sea. At a convenient elevation, in the inside of the structure, is a

seat for any person who may have occasion to seek refuge in the buoy, and who can call attention to their condition by a violent ringing of the bell. It is altogether a vast improvement over the ordinary description of buoy; and the only wonder is, that it is not more extensively adopted. We have observed several of these buoys lying in the Anchor Wharf of H. M. Dockyard for years! "I have myself," says a correspondent, "often found the benefit of Captain Peacock's admirable invention when making for the harbour channel in a dark winter's night, and when I have readily found out the Spit buoy from its conspicuous height, while I should have had the utmost difficulty in getting hold of an ordinary buoy."

TRANSIT TO THE ISLE OF WIGHT.

A memorial, signed by the principal inhabitants of Gosport and its vicinity, has lately been forwarded to the directors of the London and South-Western Railway Company, praying them to carry out the design of leading a branch of their railway to Stokes Bay, with the view to the establishment of a steam boat communication from that point to Ryde. There cannot be a doubt but that, if this undertaking be carried out, it will confer a vast benefit on the Isle of Wight, by reducing the sea passage to that lovely summer resort at least two miles, and that, too, at what is often the most disagreeable part of the passage. During south-west winds, which prevail for at least eight months of the year, Ryde is, to use a nautical expression, dead to windward of Portsmouth; that is, the steam boats have to go the whole distance against the wind; whereas if the starting point be established from Stokes Bay, it will be considerably to windward, and the sails can be used with advantage to steady the vessel in crossing with the wind "abeam." The distance will be so much reduced, and the time of crossing so much shortened, that even the worst sailors will not have time to think of being sea-sick. It is much to be wished, therefore, that the intended new route be carried out as speedily as possible, and the directors of the South-Western Railway will do well to avail themselves of the good feeling which at present exists in the locality in favour of the enterprise.

CIRCULAR STEAM TILLAGE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Years ago, in a first class café near St. Paul's (now no more), I remember hearing a party of gentlemen designate the *Mechanics' Magazine* as the best and most impartial friend inventors ever had. No matter what the scientific subject, if it were but likely to be useful, and had "two sides" to it, the then Editor would give it publicity and prominence. No doubt with a knowledge of this fact I heard Dr. Jones, a lecturer at the Adelaide Gallery, remark: "The *Mechanics' Magazine*, although it contained a great deal of correspondence which was not sense, yet was it a most valuable work; for, curious to say, when some extraordinary discovery had been brought into daily use, such as that of the electrotype, upon looking through its back volumes it was found that the germ of this very invention had, years before, not only been hinted at, but actually described."

With your permission I intend troubling your readers with a few remarks on the cultivation of land by steam power. The subject is in a great measure a mechanical one; hence I think such readers as you have will be more likely to form a just judgment on it than those who have too much or most of the agricultural in them. Hitherto my views have only been submitted to farmers.

The steam tillage problem has proved itself a knotty subject for years past; and one of the editors of a contemporary of yours evidently considers it such still. It makes a man smile, as he reads, to see how cleverly he dodges about, with the hope of not displeasing any one of the competitors for the prize of £500! One minute he is all with Boydell, the next for Fowler; then he flies off at a tangent to Williams, and as quickly retreats to bring up Collinson Hall at "high pressure." One inventor wants "power," another "ploughs;" and finally, he thinks if all their plans were amalgamated in one, steam tillage would be accomplished.

I shall not enter into mechanical detail in this letter, but rest content with one general and one special remark.

I now find that, for ten years or more, my views have been anything but gratifying to our *soi-disant* agricultural improvers: the result of my investigation of the problem has turned out antagonistic to their views. This is unlucky; but my greatest misfortune has arisen from the not being able to render my ideas into practice without asking their aid; whereas they have all possessed the means of testing their respective views

in practice; they have all tried and all signally failed, not being able to do work enough "for the money." I have not been tried: in fact, to speak out boldly, I consider myself the only *untried* "steam-cultivator" in England. The success of my plan depends on the "method;" the success of theirs has rested wholly on the "mechanism." They have tried and failed; *ergo*, this is negative evidence I *may be* right, and they wrong.

Those who have tried are excellent mechanists and their mechanism admirable; yet not one of them knows how to bring the power, or rather "powers" to bear, so as to lead to a profitable result; their results, if not doubtful, are absolutely insignificant. In their proceedings they will ignore this fact; seen in, and to be gathered from all their past employment of steam, that this power will alter—will have a "method" of its own. It will not have the method of a "plough;" it will not have the method of a "horse;" it will have a mechanical method. Now this is just their stumbling-block; they cannot stomach the idea of having to alter our "method" of field-operating. But "steam" says it must be done; and he did hope opposition on this point would not again have arisen—he would have nothing to do with the old road, he would have a "railroad;" he would have nothing to do with the blowing a ship over the waves, but he would condescend to take her up in his arms, and carry her over the waters. However, he has emphatically testified he will not waste his strength on uneconomical "methods."

Yet in the full knowledge that "steam" has ever demanded a method of its own, our inventors and farmers, for half a century or more, have been striving to hook it on to their method! We know the result in past days—re-echoed "yesterday" at Salisbury—he will not "go," so as to pay; why he will not I will explain in another letter.

I am, Gentlemen, yours, &c.,

CHARLES BURCHAM.

8, Upper John-street, Golden-square, W.

BOAT-LOWERING APPARATUS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I know not whether the epistle of "Fair Play," in your last number, needs answering, but I am quite sure that it may be answered with ease and efficacy.

The writer considers that my former letter displayed "evident partizanship." If so, it was a partizanship of a very pure kind, and of which I am not in the least ashamed. I can most confidently assert that I have not an atom of personal interest in Mr. Clifford; and I can with equal confidence assert that Mr. Clifford has not the materials for the faintest conjecture (so far as I am aware) as to who "Spectator" is. I wrote on Mr. Clifford's behalf impulsively, and without the least care for the suspicions, and reflections, and imputations of any mean-minded man or men. I knew, from my own observation of facts, which are open to every one, that Mr. Clifford had been skilful, zealous, and persevering in his boat-lowering movements, and I spontaneously and confidently spoke for him. If your correspondent can believe in nothing but partizanship, and understands nothing of the higher virtues, I shall not on that account lose the heart to utter an occasional word on behalf of what is just and right.

I never said or hinted that an editor should refrain from noticing rival inventions. I merely desired that editors, who had published an article upon an invention should (as you did), afford space to a letter which pointed out the wrong that article might lead to. I know, as well as your correspondent, that an invention must stand or fall by its own merits or demerits; but if one man should steal another's invention, he could scarcely justify his conduct by alleging that the invention is meritorious.

I do not think it at all likely that Mr. Clifford has yet obtained so many honours and emoluments from his invention that he can afford to let the remainder be openly taken from him. If he has and will say so, I shall not object to see the other Richmond ride off with it.

I shall not reply to what "Fair Play" says about Archimedes' antithesis, the humming-top, and the cross-bow. It was not written, I presume, for the perusal of persons who understand the subject, and I do understand it. Such vapouring will not change any well-formed opinion.

Of the next paragraph (the last but one) of my opponent's letter the same may be said.

To his last proposal I beg to reply, that if the writer knew anything of patent law he would be aware that many an inventor requires protection, not from improvers of his invention, but from imitators of it. Many an inventor has been ruined by men who have first imitated his plans, and then claimed his credit.

I am, Gentlemen, yours, &c.,

SPECTATOR.

SCIENTIFIC FANATICS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In glancing through an article which appeared in your Magazine for August 8th, entitled "A Few Fanatics," I was not surprised to find that fanaticism had its votaries in science, as well as in religion, although I was not aware that they are so numerous as the article in question leads me to conclude they are; for I suppose that as the Editor of the *Meteor of Science* meets with such a numerous and singular class of individuals, it is right to conclude that the Editors of other scientific journals have similar experiences, thereby implying the existence of a race of visionaries as yet almost unknown to the public at large. My object in troubling you with this communication is to caution your readers, and the public generally, against branding as fanatics those who by their inventive genius are destined to confer upon the world great social and commercial benefits. We must bear in mind the fact, that those men who have been the means of bringing into operation the many wonders with which we are now familiar, were in numerous instances looked upon with suspicion, slighted, and designated "fanatics" or something worse; and it was not until after they had passed away that their discoveries were brought to light, and the truth of their theories demonstrated to the letter. We ought, then, to be careful ere we affix the brand; better for twenty madmen to pass for men of genius than for one man of genius to be branded as a fanatic.

I am, Gentlemen, yours, &c.,

Theorist.

SCIENTIFIC QUESTIONS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I shall feel obliged if you could inform me of some magazine or periodical where I could obtain answers to various questions in different departments of science. For example, I am desirous of knowing the quantity of metal in 1 lb. of vermilion; what alloy of copper will melt at a low temperature; how to soften steel; what state acetate of iron ought to be in for printing purposes, and many other queries of various kinds. I am anxious to know of some periodical who give answers to correspondents on various branches of science. An answer in your magazine will oblige,

Yours, respectfully,

A Reader.

[Is our correspondent quite sure that he is reasonable in expecting to find a periodical which will afford him such very varied information? It may be an easy thing to ask editors for such knowledge, but it is far more considerate and proper to seek for it personally in libraries. One might write an important article in the time he would have to devote to the solution of many questions which are proposed. We have no objection to a moderate amount of interrogation, but we cannot undertake to publish information which may be conveniently found in works of reference.—Eds. M. M.]

REFLECTORS FOR GAS-LIGHTS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In your Magazine of today you mention an invention of M. Jobin for preserving plated reflectors. We beg to draw your attention to our solid glass reflectors, in which the reflection depends on optical principles, and needs no plating or silvering. Our Catodioptric reflectors for throwing the light downwards, and the prismatic reflectors for throwing the light horizontally, will be found to answer where the ordinary plated ones soon become useless.

We are, Gentlemen, yours, &c.,

Pettit & Co.,
Gas Engineers.

459, 460, 461, Oxford-street.

[An illustrated description of the patent reflectors of Messrs. Pettit and Co. was given at page 368 of our 59th vol. Our warm approval of their invention was there expressed. Eds. M. M.]

MISCELLANEOUS INTELLIGENCE.

The Transports. — A correspondent, writing from Portsmouth on the 12th, says: —"We have again had two splendid steam ships in the port during the week, for the reception of troops for India and China—the *Imperatrice* and *Sarah Sands*. I observe that the first named vessel is rigged with the Cunningham system. The rig of the latter vessel is remarkable. She has four masts, the two middle of which are fitted with yards, and the other two only for fore and aft sails. Much benefit may be derived from this arrangement. The absence of yards from the foremast must relieve the fore part of the ship from much weight, and so ease her in a head sea, and the main pressure of the sails is brought on to the body of the ship. It would be well for naval men to reflect on these considerations."

Old Rochester Bridge.—The demolition of old Rochester Bridge is rapidly progressing. It is intended to form a fine river-side quay out of the debris of the

ancient structure, the balustrades of which will form the sides of the new quay. It will be a great adornment to this picturesque city, and calculated to increase the attractions of it as a pleasant and convenient spot for a ramble out of town. Much dissatisfaction is expressed by the inhabitants of Rochester at the railway-bridge completely hiding the view of the river eastward from the carriage and foot passengers' bridge. It is, however, an evil that the engineers could not have got over without raising the railway bridge considerably higher than it now is, which the rise of ground on each bank of the river would not admit of. The evil is, however, much to be regretted. It may also be remarked, that the view of the bridge itself from the river on the Frindsbury side is extremely ugly. Altogether the railway bridge has ruined the beauty of the place, and will never be looked upon by a person of taste without considerable pain.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

PERRY, J. *Improvements in the treatment, application, and use of mineral tar for the production of oleaginous and lubricating matter and fuel.* Dated Dec. 6, 1856. (No. 2897.)

By this process common coal tar is distilled in a boiler or retort, and the resultant naphtha and dead oil are condensed. The naphtha and dead oil being mixed together, a preparation of lime is added, the whole being well agitated. This mixture changes in a short time into a soft yellow grease, which may be made firmer by the addition of more lime. The addition of the lime greatly increases the product of lubricating matter. Whilst the waste tar is soft it is utilised by adding a proportion of peat charcoal or carbonized peat. This mixture produces an artificial fuel almost equal to the best coal.

LONGBOTTOM, J. *Improvements in generating, surcharging, or superheating steam.* Dated Dec. 6, 1856. (No. 2898.)

Ordinary steam, in place of passing direct to the cylinder of the steam engine, is first brought in contact with a series of superheating or surcharging hot water pipes, and heated by the ordinary boiler furnace, or not. These pipes or tubes are partially filled with water, and are so disposed as to produce a rapid circulation of water and heat through them.

SMITH, S. R. *Improvements in anchors.* Dated Dec. 6, 1856. (No. 2901.)

Here two shanks are used, and come together at one end to receive a single stock. The two shanks beyond the stock are inclined to each other, and at their outer ends or crowns they are connected by a crown plate which has axes or necks formed at the two ends thereof. The axes or necks on the crown plate pass through holes in the ends of the shanks in such manner as to turn freely therein, and are retained by keys. The arms, with the palms or flukes thereto, are fixed on square parts formed on the necks or axes of the crown plate, and they move between forked ends in the ends of the shanks. The crown plate, by entering the crown, adds materially to the holding powers of the flukes.

LESLIE, J. *An improvement in stoves and fire-places.* Dated Dec. 6, 1856. (No. 2902.)

A stove or fire-place is made with a solid bottom, as in a former patent of the patentee's. The front is formed with a grating; the back is made, by preference, of fire-brick. The outlet or flue into the chimney is just above the bottom of the stove or fire-place, so that the air entering in front passes to the flue through the fire. That part of the air which enters the fire above the flue, together with the smoke, passes downwards through the ignited fuel near the bottom.

EATON, R. *An improvement in the manufacture of springs when India-rubber is used.* Dated Dec. 8, 1856. (No. 2905.)

This invention consists in making the springs of pieces of india-rubber of less than half an inch in thickness.

ASTON, J., and J. BRANT. *An improvement in the manufacture of covered buttons and covered ornaments.* Dated Dec. 8, 1856. (No. 2906.)

In these buttons the front metal shell has the central part removed, and the edges around are raised in order to become or act as a frame to receive a central ornament, which may be covered, or plain, or of pearl, shell, glass, or metal.

BLAIN, J. *Improvements in jacquard apparatus for weaving.* Dated Dec. 8, 1856. (No. 2908.)

This relates to the cards or unperforated pieces employed in weaving ornamental fabrics in the jacquard loom, and consists in making the cards or pattern surfaces of such materials and in such manner as to secure them from derangement from thermal changes. These new cards or pattern surface pieces are made of woven fabrics.

MILLER, R. F. *A mode of printing tables of fares, advertisements, notices, tablets, ornamental designs, figures, and other like announcements on painted or other surfaces to supersede writing.* Dated Dec. 8, 1856. (No. 2910.)

This consists in superseding writing by printing, or in printing with paint instead of ink, and thereby obtaining a surface with printed characters, letters, &c., thereon.

Burwell, E. *An improvement in roasters for coffee, cocoa, chicory, and similar substances.* Dated Dec. 8, 1856. (No. 2911.)

This consists in the employment of wire or wire gauze to form the ends of the ordinary or other sheet iron coffee cylinders used in roasting coffee, &c.

Vicars, T., sen., and T. jun., T. Ashmore, and J. Smith. *Improvements in the manufacture of biscuits, lozenges, and other like articles of confectionary.* Dated Dec. 9, 1856. (No. 2915.)

This relates to machinery for forming dough, &c. Its novelty consists mainly in the arrangements of the webs, and in the dough being pressed between them without coming in contact with the rollers, and also in their action being intermittent.

Peake, T. *Certain improvements in the manufacture of chenille, and other piled fabrics.* Dated Dec. 9, 1856. (No. 2916.)

This relates to a patent granted to T. Peake, W. Smith, and W. Dickinson, dated Nov. 13, 1851, and cannot very well be described without engravings.

Mace, A. M. *A new manure for preventing the vine and other diseases arising from the soil, and for other similar purposes.* Dated Dec. 9, 1856. (No. 2918.)

This consists in employing the ashes of wood and charcoal, or coal cinders, &c., combined with human urine in equal proportions by measure. The mixture of the above-named substances constitutes what is called "Fremont's manure."

Scartliff, J. R. *Improvements in apparatus to be employed as an alarm and detector in cases of burglary.* Dated Dec. 9, 1856. (No. 2919.)

The object here is to obtain by means of a system of levers, cranks, and connecting wires acting upon a dial or index, an apparatus which shall possess the power of indicating both by sight and sound any burglarious attempt upon the doors or windows of a house; also indicating the part of the house upon which the attempt is being made.

Walton, J. *Improvements in tables.* Dated Dec. 9, 1856. (No. 2920.)

Claim.—The adaptation to tables, which may be used for ornamental or useful purposes, of a sliding top, for the purpose of allowing apparatus to be elevated and exposed for use.

Mottet, H. *An improvement in fulling woven woollen fabrics.* Dated Dec. 9, 1856. (No. 2923.)

The woven fabrics are subjected, when in contact with steam, to the ordinary mechanical action of the fulling stocks, which are suitably inclosed to retain the steam.

Storey, W. and T. *Improvements in forming ornamental devices on the surface of paper and certain prepared woven fabrics.* Dated Dec. 10, 1856. (No. 2926.)

Claim.—The production of ornamental devices on the surface of paper and woven fabrics, by coating such surface with plastic colour, and then impressing it with blocks or cylinders having figures in relief, which break up and redistribute portions of the colour into figures having a resemblance to those formed in the blocks or cylinders.

Macarthur, A. *Improvements in boiling, bleaching, washing, or cleansing fibrous materials.* Dated Dec. 10, 1856. (No. 2927.)

Claims.—1. The use for boiling, bleaching, washing, or cleansing fibrous materials, of a rotating vessel formed with chambers communicating each on one side with intermediate spaces open at their outer ends, so as to admit water or liquid to each chamber in succession, and allow it to issue thence as the vessel rotates with its lower part immersed in the liquid. 2. The use of a rotating chamber (as before described) working either in an open trough, or completely enclosed in an external vessel or case. 3. The mode of constructing a single apparatus so that the several operations can in succession be carried on in it. 4. The mode of bleaching fibrous materials by means of gaseous matters, such as chlorine, alone or combined with other gases.

Green, J. *Improvements in the mode of manufacturing glass lights for street vaults, ships, buildings, and friction boxes, and the apparatus for ladling or conveying the molten glass from one furnace to another.* Dated Dec. 11, 1856. (No. 2931.)

This consists—1. In casting or putting molten glass into metal frames, made with a groove to prevent the glass being separated from the frame by external pressure that may be put upon it after it has become annealed. 2. In suspending to the roof of the glass manufactory an iron bar, forming a railroad for receiving a flanged pulley, to the axle of which is suspended a chain or rod; to the end of the latter is attached a ladle, having at one end a bowl for ladling the molten glass out of the pots, and at the other end a cross handle for the operator.

Chatwin, J. *An expanding compensating slide for sustaining gas and other lights, also applicable for other similar purposes.* Dated Dec. 11, 1856. (No. 2932.)

Claim.—The regulating of the sliding or telescopic action of chandeliers, gas pendents, &c., by the use of a spring so arranged that the force of it may be exerted against the surfaces of the sliding parts, by which means counterpoise weights are superseded.

Burke, M. *Improvements in the construction of anchors.* Dated Dec. 11, 1856. (No. 2935.)

This consists in making the shanks of

anchors with a joint near where the shank joins the crown of the anchor, instead of in the crown thereof, as is usual.

WHEATLEY, T. and W. *Improvements in fog-signals, and in the means of working the same.* Dated Dec. 11, 1856. (No. 2936.)

The patentees make the signal of an explosive material, and either enclose it in a soldered air-tight case, or immerse it in a solution to make it impervious to water or damp. They fix to the signal two clips that, when pressed over the rail, clip it firmly. They also apply the signal to the rail whilst the train is in motion, by adjusting a tube or slide from the van, at the lower end of which tube the signal is held at a short distance from the rail. In this tube they place a rod worked by a rack and pinion, or by a spring, so that the signal may be struck or pressed upon the rail by the person in charge whenever it is necessary. They also give the signal man or station master the power of applying the signal to the rail by means of an apparatus to be worked by the wire or rod used to work the ordinary distance signals.

EMERY, R. *Improvements in the construction of certain kinds of agricultural implements (for breaking clogs of earth and levelling the soil) called harrows.* Dated Dec. 11, 1856. (No. 2939.)

This consists in so forming harrows that the line of draught and the distribution of the teeth may be so arranged that a few of them only enter the earth at the forward end of the implement, and so come on in succession, that by the time the harrow has travelled its whole length, the earth is broken uniformly throughout, and end with the whole number of teeth following each other in proper order and at parallel distances.

LUND, W. *An improved spring clip for holding or retaining loose papers, or other loose articles.* Dated Dec. 11, 1856. (No. 2940.)

This consists in the use of a cylindrical spring clip, the simplest form being made thus, O, the principal feature of which, being extended or varied, constitutes the object of these improvements.

COLLIER, G. *Improvements in machinery or apparatus for the manufacture of piled fabrics.* Dated Dec. 11, 1856. (No. 2941.)

This relates to machinery whereby two like textures are produced at the same time, and united in the weaving by the threads forming the pile, and separated when woven into two distinct fabrics by the cutting across of such pile. It comprises several improvements.

ANDERTON, F. W., and J. BEANLAND. *Improvements in apparatus or means in connection with furnaces to facilitate the consumption of smoke.* Dated Dec. 11, 1856. (No. 2942.)

This consists, when using hollow fire-bars, in conducting atmospheric air thereto through funnel-shaped conductors to the inner ends of such bars, in order that such air may traverse the bars to the front ends of them, where there are openings to admit of its escape into the fire-place in front of the fuel therein.

MILES, W. P. *Improvements in locks and fastenings.* (A communication.) Dated Dec. 11, 1856. (No. 2944.)

Here a piece of paper or card is introduced over the keyhole, and under a cover of one face of the lock. The piece of card or of paper has formed in it an opening for a bolt to pass through, and such bolt also passes through corresponding openings in the case of the lock, so that, when the bolt has been introduced, and is locked by a spring catch or holding instrument, the keyhole cannot be got at without destroying or defacing the piece of card.

HUMFREY, C. *The application and use of paraffine in the manufacture of hair-oils, ointments, and plasters for medical purposes.* Dated Dec. 11, 1856. (No. 2945.)

This consists in mixing pure paraffine with some liquid oil, and perfuming it according to taste. For the preparation of ointments the invention consists in using paraffine instead of spermaceti, &c., and for the manufacture of plasters the paraffine must be softened by combining it with some liquid balsam possessing antiseptic qualities.

KING, H. *Improvements in machinery for thrashing and dressing wheat and other grain.* Dated Dec. 11, 1856. (No. 2946.)

This consists—1. In a new form of shaker. 2. In a new form of beaters. 3. In the use of an endless feeding cloth, for conducting the grain into the machine with which it is combined. 4. In the use of cleaners for separating extraneous matters from the straw after it has been thrashed and passed out of the machine to which such said cleaners are connected. 5. In the use and adaptation to the above combined machine of two blowers mounted on the same shaft. 6. In the use and adaptation to the above machine of a new form of sieve so constructed that the meshes thereof, instead of being arranged horizontally, are arranged vertically.

CAMBRIDGE, W. C. *An improved construction of portable railway.* Dated Dec. 11, 1856. (No. 2947.)

This is something like Boydell's endless railway. The patentee adapts to each wheel a set of plates or sustaining pieces made flat on their under face, which severally receive in turn the pressure of the wheel as it

revolves. These pieces are connected together by being jointed to a double set of levers, which act as links and bind all the parts together into an endless railway.

MARGUERITTE, L. J. F. *Improvements in purifying rock and sea salt.* Dated Dec. 11, 1856. (No. 2948.)

This consists in fusing the raw salt, and keeping it for some time in a state of tranquil fusion, decanting it into hot moulds, or letting it cool slowly; in this manner all the impurities are separated from the mass in fusion, and are eliminated by crystallisation by the dry process, which corresponds with crystallisation by the wet process.

WRIGHT, J. T., and E. P. *A new or improved manufacture of ropes, cords, twines, and mill bandings.* Dated Dec. 12, 1856. (No. 2950.)

The patentees take a wire of iron or other metal, and coil around it hemp or other fibrous substance twisted into a thread. The hemp covers the wire, lying thereon in a helical or corkscrew-like form. The covered wires or threads thus made are combined into strands, and the strands into ropes, cords, lines, twines, and mill bandings in the usual manner.

GIANDONATI, R. L. *Improvements in over shoes.* (A communication.) Dated Dec. 12, 1856. (No. 2951.)

This consists in introducing a stiffening piece at the back of the over shoe. To facilitate the removal of the shoe from the foot without soiling the fingers, he inserts a short metallic stud on the back of the shoe or heel, so that by placing the toe on this projection the over shoe may be drawn off.

PATON, E., and C. F. WALSH. *Improvements in apparatus for charging and capping the nipples of fire-arms.* Dated Dec. 12, 1856. (No. 2952.)

This relates to a contrivance for the double purpose of charging the nipples or breeches of fire-arms with gunpowder after "miss fires," or after the inadvertent charging of the pieces with shot instead of gunpowder, and the capping of the nipples with percussion caps.

WIMBALL, H. *Improvements in machinery or apparatus for the manufacture of bricks, tiles, pipes, and other articles of a similar nature.* Dated Dec. 12, 1856. (No. 2954.)

This consists in the use of a moveable carriage, caused to pass under or in connection with a pug mill, so that the exuding stream of clay is carried away from the machine by a continuous self-acting operation, the motion of the clay itself imparting the requisite traverse to the carriages.

HEADLEY, J. H. *An improved mode of manufacturing artificial granite in various forms, and plating or veneering the same with marble, so as to present an exterior of marble, and an interior of stone or granite.* Dated Dec. 12, 1856. (No. 2956.)

1. Take good clean sand, and to this add a portion of fresh burnt lime (protoxide of calcium) reduced by grinding to an impalpable powder. Incorporate those two substances intimately. The natural dampness of the sand will slack the lime, which, in heating, will cauterise the silicon, and form a thin film or pellicle of lime over each grain of silica. When the composition has become cold and amalgamated, it is moistened with water until sufficiently damp to pack. This composition forms the granite or coarse base of the articles to be moulded. 2. Take granulated marble (pulverised carbonate of lime), and mix it with ground unslacked lime in the same proportions and manner as the siliceous matter above described, and moisten the same until sufficiently damp for packing. When it is desired to employ these two compositions in moulding any article, place them in a smooth metal mould, so as to leave the sand and lime in the interior of the block, and a thin lamina of the marble and lime on the outside. Then subject the mass to a great pressure and remove it from the press; the moulded block will then gradually harden by the absorption of carbonic acid gas from the atmosphere.

PEASE, H., and T. RICHARDSON. *Improvements in the manufacture of compounds of alumina.* Dated Dec. 12, 1856. (No. 2957.)

Common salt or muriate of potash is mixed with china clay or other suitable aluminous material, and sulphuric acid is added to convert both the alumina and the muriate into sulphates.

BIRKBY, W. B. *Improvements in the manufacture of pointed wire fillets used in the preparation of flax, tow, hemp, and other fibrous substances.* Dated Dec. 12, 1856. (No. 2959.)

In place of employing the ordinary filleting or backs for receiving the pointed wire teeth, filleting or backs are prepared by glueing or cementing several thicknesses of canvas together, the upper surface being formed of leather similarly cemented. The pointed wire teeth are set in the ordinary manner.

SHERWIN, G. *Improvements in the manufacture of fire bricks, tiles, crucibles, and other articles when clay is used.* Dated Dec. 12, 1856. (No. 2960.)

In place of employing the fire clay and silicious matters in the ordinary condition, they are first slipped separately, and then combined together, with burned clay and silicious matters. The fire clay or marl is prepared by grinding as usual, and then slipped, all particles of iron ore stones, &c.,

being removed. The crude or calcined flint, sand, quartz, or silicious matters are also ground and slipped. These matters are combined with suitable quantities of similarly prepared clay which have been burned and crushed, and the combined plastic compound is made into bricks, tiles, &c., in the ordinary manner.

BOUSFIELD, G. T. *Improvements in looms for weaving cut piled fabrics double.* (A communication.) Dated Dec. 12, 1856. (No. 2961.)

This relates to the mode of organising parts of the power loom for weaving cut piled fabrics double, whereby the motions of the jacquard machine, shuttles, and pile wires, are brought into different relative co-operation from what has heretofore been done, the object being in part to obviate the difficulty of making an even selvage consequent upon the figuring warps as they pass from one fabric to the other, crossing the other warps forward of the fell or cloth forming line, and in part also to form the fabrics woven, whether of double or single bind shot velvets, in the same manner with respect to the said binding shots as when such fabrics are woven single.

SMITH, J. *Improvements in jacquard machines for weaving.* Dated Dec. 13, 1856. (No. 2963.)

This relates—1. To an arrangement of the needles and hooks of jacquards that are sprung by a bent tail-piece on the hook, which reduces the friction and diminishes the power required in working, and allows each hook and needle to be removed without disturbing the others. 2. To a mode of causing the griff to become inclined as it rises in hook jacquard machines, so as to make the warp threads form an even shed. 3. To mechanism for actuating the card barrel so as to bring it against the needles. 4. To an arrangement of the part on the card barrel called the lantern, and the parts operating upon it, which are employed to rotate the barrel, and to hold it square after each rotary movement. 5. To jacquard machines where the griffs or trap boards are made so as to work when required in two divisions, which alternately rise and fall, the card barrel turning one card for both lifts of the griffs or trap boards.

METCALF, J. *Improvements in the manufacture of alum or sulphate of alumina.* Dated Dec. 13, 1856. (No. 2965.)

This consists in modes of manufacturing alum or sulphate of alumina from clay of any description whatever which contains alumina as a base.

LITTLEWOOD, G. *Improvements in printing geometric patterns.* Dated Dec. 13, 1856. (No. 2968.)

This is applicable to printing in colours geometric patterns, such as those used for Berlin work. The type is either square in section, or of other form capable of fitting together so as to make up a solid block. In connection with these type shorter pieces of metal, circular in section, are used. These are called raising pieces, and have pins projecting from their upper ends which fit into holes in the bottom of the type. When the printing block is to be prepared for printing one of the colours of a geometric pattern, the printing block is turned upside down, and a raising piece is placed under each of the type which is required to print, and the pin of the raising piece enters the hole in the bottom of the type. When the required number of raising pieces have been put under the type, the form and printing block is again turned over, and the type which have not been furnished with raising pieces fall below the level of the others.

TURNER, A. *Improvements in the manufacture of elastic fabrics.* Dated Dec. 13, 1856. (No. 2969.)

This relates—1. To the ornamentation of elastic cords by forming round them a helical coil similar in appearance to the thread of a screw. 2. To ornamenting flat elastic bands such as are used for braces, &c., by producing a watered appearance on the surface thereof.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

BROWNING, J. *Improvements in stereoscopes.* Dated Dec. 9, 1856. (No. 2914.)

This consists in wholly or partially coating the exterior of the instrument with glass, either silvered, painted, etched, or otherwise ornamented, and in the employment of coloured screens of glass to intercept the light transmitted directly through glass, or reflected upon paper, thereby producing effects upon the pictures when viewed with the improved stereoscope resembling those produced by what are known as Claude Lorrain glasses.

RAWSON, J. *Improvements in lubricators.* Dated Dec. 9, 1856. (No. 2917.)

This relates to apparatus for lubricating the journals of horizontal shafting, and consists of a tube and ball forming a valve, with a cup or vessel resting on a shoulder near the top of the tube, the ball or globe resting on the top of the tube inside the cup or vessel, &c.

CARR, W. S. *Improvements in water-closets.* Dated Dec. 9, 1856. (No. 2921.)

The inventor makes use of the weight of the person on the seat (moving the same slightly), or a handle and screw, to actuate the parts to which the improvements relate,

which are a cock to let in the water, and means for emptying the pan that sets up under the basin of the closet.

Muspratt, E. K., and B. W. Gerland. *Improvements in treating waste liquors produced in the manufacture of chlorine, and in separating nickel, cobalt, and copper from liquids containing them in combination with manganese and iron.* Dated Dec. 9, 1856. (No. 2922.)

This is chiefly applicable to the separation of nickel, cobalt, copper, and oxide of manganese ores. These ores are frequently used in the manufacture of chlorine, and by this process the ore is brought into a suitable state. In order to separate the nickel, cobalt, and copper, the inventors take the liquid as it runs from the chlorine still, and, having brought all the metals into complete solution, add carbonate of lime to precipitate the iron, which is then separated by filtration. From the filtrate or clear solution copper is separated by adding sulphuretted hydrogen and again filtering; the solution now contains nickel, cobalt, and manganese; to this sulphuret of calcium is added, by which the nickel, cobalt, and part of the manganese is rendered insoluble. From this insoluble precipitate, the manganese is dissolved out by weak muriatic acid, leaving the mixed sulphurets of nickel and cobalt from which the two metals are obtained by processes now in use. The manganese is separated from its solution by the addition of lime which throws it down as protoxide.

Ward, F. O., and F. Wynauts. *Improvements in the manufacture of manures.* Dated Dec. 9, 1856. (No. 2924.)

This relates to manures obtained by the disintegration of azotised organic matters; for example, the waste of wool, horn, hair, leather, silk, worn out clothing, old shoes, woollen rags, animal offal and excrements, fish, &c. Instead of employing vessels open to atmospheric pressure for the reduction of the above substances into manure, the inventors employ a closed boiler or digester, whereby they produce higher degrees of pressure and temperature than heretofore.

Thornett, J., jun. *Improvements in gas-burners.* Dated Dec. 9, 1856. (No. 2925.)

This relates to burners that have a button placed within the light, and consists in making in this button a hollow channel through which the gas passes previous to its emission from the burner to be consumed. The gas is by this means highly heated, and produces a white flame, with very little blue flame at the lower part.

Newton, W. E. *Improved apparatus for supplying steam boilers with water.* (A communication.) Dated Dec. 10, 1856. (No. 2928.)

This consists of a vessel in the form of a cylinder provided with two holes, one on the top side and the other on the under side, so that there is a passage through the vessel, but not in a direct line. This vessel is mounted in a casing, to which it is made to fit accurately; the casing, being provided with openings at top and bottom, communicates with a cistern of water above, and with the steam boiler below. The vessel is moveable in its casing, and may be actuated by an eccentric, the object being to bring the opening at the upper side of the vessel opposite to the opening in the casing communicating with the water cistern above, so that the vessel may be filled with water, and then by removing the said vessel back into its former position, the opening on the under side thereof will be brought opposite to the exit opening of the casing, when the water in the vessel will pass down the pipe into the boiler.

Smith, T. *An improved joint for folding handles or sticks of umbrellas and parasols.* Dated Dec. 10, 1856. (No. 2929.)

This consists in fitting a bayonet joint to sticks or handles of umbrellas and parasols, in combination with the ordinary folding joint.

Cornes, J. *Improvements in chaff cutting machines.* Dated Dec. 10, 1856. (No. 2930.)

This consists—1. In fitting to the shaft which communicates motion to the pressure and feed rollers through a worm, a worm of peculiar form. 2. In forming the feed rollers alternately with grooves and ridges and with plane surfaces, and in gearing them together so that the grooves and ridges in one roller shall come opposite to the plane surfaces in the other, and in casting or affixing on to the ends of rollers, axes, whereby the ordinary through axes or spindles will be dispensed with.

Burke, M. *Improvements in mariners' compasses to counteract local attraction.* Dated Dec. 11, 1856. (No. 2934.)

This consists in constructing the boxes of mariners' compasses so that the magnetic needle and its card, being enclosed in a lesser and water tight glazed case, can be surrounded with water, spirit, oil, &c., in the outer box or case.

Reay, W. W. *An improvement or improvements in shoes for horses and other animals.* Dated Dec. 11, 1856. (No. 2937.)

This consists in the application to the shoes of animals of moveable pieces, which may be replaced when worn by others, and the shoeing of the animal rendered less frequently necessary.

Delperdange, V. *Improvements in metallic and elastic packing.* Dated Dec. 11, 1856. (2938.)

This consists of a combination of concentric rings fitted round the piston rod in the ordinary packing box, the extremities

of which rings have a conical, spherical, or other form, permitting them to glide over each other, and thereby to press on rings of vulcanised india rubber, &c., by which latter the passing of air or any other elastic fluid between the piston rod and the packing is intercepted.

SCHAEFFER, W. C. T. *Improvements in distilling fatty and oily matters.* Dated Dec. 11, 1856. (No. 2943.)

In carrying out this invention a still is externally heated so as to insure a temperature of about 230° Fahr. Into this still a pipe for the supply of free steam is inserted, which pipe passes below the fatty or oily matters, and is coiled or branched and perforated so as to divide the stream into numerous streams. The steam used is not superheated. A second pipe is introduced into the still to admit atmospheric air, the lower end of which has a rose or perforated head formed thereto, which comes above the level of the fatty or oily matters in the still. Above the break or outlet pipe of the still is a cistern containing hot water combined with liquid ammonia, from which a pipe descends into the beak or outlet pipe of the still, and the quantity of liquid allowed to pass is regulated by a suitable cock in the pipe. The end of the beak or outlet pipe of the still is connected to a covered cistern or reservoir, from which rises a pipe for the escape of vapours. The fatty matter, mixed with an alkali or alkaline earth, is introduced into the still, and distilled over into the reservoir at the end of the beak or outlet pipe of the still.

FONTAINEMOREAU, P. A. L. DE. *Improved railway signal apparatus.* (A communication.) Dated Dec. 12, 1856. (No. 2949.)

This consists in fitting to the rails at suitable distances a rod which projects a little above the rail, so that when the wheels of a train pass over it they depress it, and thus put into action the manipulator provided with a suitable spring playing between two metal conductors, so as to establish a current of electricity (generated from batteries placed at convenient distances on the line) between the manipulator and receiver connected with the signalling apparatus.

FOSTER, W. *Improvements in petticoats.* Dated Dec. 12, 1856. (No. 2953.)

This consists in weaving one or more satin or twilled stripes across the piece at suitable intervals, so that, when cut up into lengths to be manufactured into petticoats, the stripes which are woven with a stronger or thicker worsted or other weft than the ground of the piece will run round the lower portion of the garment, and by their greater closeness and compactness will impart considerable stiffness or body thereto.

CAWOOD, J., J. BEESON, W. SMITH, and R. HENCHLEY. *Improvements in the valves of steam engines.* Dated Dec. 12, 1856. (No. 2955.)

This consists in causing a circular valve to move over the entire surface of the fixed surface with which it is in contact. There is a rotating piston employed as a clutch in connection with the slide valve, against which said piston the steam presses for keeping the rubbing surfaces in close contact, the exposed surface for the steam to act against being considerably less than the surface of the valve, so as to reduce the friction as much as possible.

NEWINGTON, S. *Improvements in hand hoes and cultivators.* Dated Dec. 12, 1856. (No. 2958.)

This consists in constructing hand hoes which, by changing certain of the parts, can be converted into cultivators.

BRAUN, L. *Improvements in caps and such like articles.* Dated Dec. 13, 1856. (No. 2964.)

A series of cells or pockets are formed in the material of which the cap or other article is made, by rows of stitching of a shape corresponding to the form of the stiffening pieces, and into these cells or pockets the stiffening pieces are placed by stitching, binding, or otherwise.

PROVISIONAL PROTECTIONS.

Dated June 30, 1857.

1828. Joseph Alsop and Edward Fairburn, of Mirfield, Yorkshire. Improvements in machinery for the manufacture of bread, biscuits, and cakes.

Dated July 14, 1857.

1950. Samuel Nye, of Wardour-street. Improvements in chaff cutting machines.

1952. William Wyatt, of Bury St. Edmunds, farmer. Improvements in hay making machines.

1956. William Stettinius Clark, of High Holborn. Improvements in machines for harvesting grain and grass crops, and in the automatic delivery thereof. A communication from A. H. Caryl, of Sandusky, America.

1958. Hugh Smith and Frederick Moore Smith, of Porchester-square, gentlemen. An improvement in fire-arms.

1960. Thomas Ashton, of Abbey Mills, Morpeth, woollen manufacturer. An improvement in teasing, scribbling, carding, and combing engines.

1962. William Henry Gauntlett, of Middlesbro'-on-Tees. Improvements in thermometric apparatus.

Dated July 15, 1857.

1964. William John Locke, of Edgeley, Cheshire, draper. Constructing an improved oil can.

1966. Edmond Bertin, of Aldgate, gentleman. A new manufacture of fibre, suitable for the purposes to which hemp and flax are usually applied.

1968. Gavin Walker, of Glasgow, manufacturer, and James Clachan, of the same place, manager. Improvements in looms for weaving.

Dated July 16, 1857.

1974. John Cox, of Gorgie Mills, Edinburgh, glue maker. Improvements in apparatuses to enable persons to progress in swimming.

Dated July 17, 1857.

1978. Charles Fréderic Vasserot, of Essex-street, Strand. An apparatus for measuring and registering the flow of liquids. A communication from F. F. Benvenuti, of Paris.

1982. William Barwell, of Birmingham, metal dealer. An improvement or improvements in casting metals.

1984. John Henry Johnson, of Lincoln's-inn-fields. Improvements in steam boilers. A communication.

1986. Alfred Upward, of Duncan-terrace, Islington, gas engineer. An improvement in the manufacture of coke.

1988. Thomas Roberts and John Dale, of Manchester, manufacturing chemists. Improvements in obtaining pigments from dye-woods, and in the application of a pigment to printing paper hangings.

Dated July 18, 1857.

1990. James Austin, of Millisle Mills, Donaghadee, Ireland, bookkeeper. Improvements in machinery or apparatus for ploughing or cultivating land.

1992. George James Wainwright and Charles Timothy Bradbury, of Dukinfield, Chester, cotton spinners. Improvements in apparatus for diminishing the amount of waste in the use of cops for manufacturing purposes.

1994. William Edward Newton, of Chancery-lane. An improved construction of combined steam boiler and radiator for warming apartments or buildings. A communication.

Dated July 20, 1857.

1996. Richard Bolton, of Blackburn, overlooker. An improved mode of weighting the yarn-beam in looms used in the manufacture of cloth by steam power.

1998. Frederick Hall Holmes, of Blackwall, analytical chemist. Improvements in magneto-electric and electro-magnetic machines.

2000. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and patent agent. Improvements in the manufacture of pipes and tubes. A communication.

2002. William Edward Newton, of Chancery-lane. Improved machinery for feeding flour and mixing and kneading dough for the making of bread and biscuits. A communication.

2004. Robert James Maryon, mechanician, of Hooper-street, Lambeth. Improvements in the construction of propellers and in arrangements of engines for working the same for propulsion of ships or vessels.

2006. Joseph Conway, of the Margam Copper Works, Taibach, S. Wales. Improvements in the production of copper rollers for printing calico and other fabrics.

Dated July 21, 1857.

2008. Josiah Claughton Arnall and George Greenhow, of Ferry-bridge, near Pontefract, York. Improvements in the manufacture of glass bottles and jars, and in the apparatus connected therewith.

2010. Frederick Warner, of Jewin-crescent, Cripplegate. Improvements in ball and other cocks, and valves.

2012. William Edward Newton, of Chancery-lane. Improved machinery for manufacturing screws, or screw caps, of sheet metal. A communication.

Dated July 22, 1857.

2015. James Hall, of Lancaster, engineer. Improvements in the mode of preventing incrustion in boilers.

2016. Alfred Vincent Newton, of Chancery-lane. Improved machinery for grinding and polishing stone, glass, and other materials. A communication.

2017. Joseph Kirby, of Bodicote, Oxon. Improvements in hay and other rakes.

2018. Henry Doulton, of Lambeth. Improvements in the manufacture of earthenware drain and other pipes.

2019. Murdoch McKay, of Hackney, and Lewis Rose, of Holborn, London, gentlemen. Improvements in apparatus to be used in washing and scouring household linen and other textile fabrics.

Dated July 23, 1857.

2020. John King, of Cannon-street, City. Improvements in the preparation of peat and peat coke or charcoal, and in machinery or apparatus for that purpose. A communication.

2021. Moses Clark, of Saint Mary Cray, Kent, and George Bertram, of Edinburgh, engineers. Improvements in machinery or apparatus for cutting paper.

2022. William Deakin, tool maker, and William Phillips, strip-steel roller, of Birmingham. Certain improvements in the manufacture of metallic pens and pen-holders.

2025. William Hudson, of Burnley, machinist, and Christopher Catlow, of Clithero, overlooker. Certain improvements in looms for weaving.

2026. Edward Wilson, of Worcester, engineer. An improved method of consuming smoke.

2027. Charles Norris, of Sowerby-bridge, Halifax, York, manufacturing chemist. Improvements in the manufacture of sulphate of alumina and the application of the same so manufactured in dyeing, printing, paper making, and such like purposes.

Dated July 24, 1857.

2028. Joseph Needham, of Piccadilly, gun manufacturer. Improvements in fountain pens.

2029. James Burrows, of Wigan, Lancaster, engineer. Certain improvements in steam engines.

Dated July 25, 1857.

2031. Joseph Bennett, of Pimlico, contractor. Improvements in boring tools for wells, shafts, and like purposes.

2033. John Scott Collins, of Liverpool, sail maker. Improvements in reefing and furling of ships' and other vessels' sails, and in the manufacture of the same.

2034. Julius Schönemann, of Portland-street, Portland-place. Improvements in the construction of weighing machines. A communication.

2035. Frederick Oetzmann and Thomas Luis Plumb, of Great Russell-street, Bloomsbury, pianoforte manufacturers. Improvements in upright pianoforte actions.

Dated July 27, 1856.

2036. John Gedge, of Wellington-street South, Strand. Improvements in doubling machines. A communication from G. Collé, of France.

2037. William Williams, of Dale, Pembroke, engineer and contractor. Improved graving slips for the repairing of ships.

2038. William Blake Williamson, of Bradford, York, commission agent. Improvements in looms employed for weaving textile fabrics and fibrous materials.

2039. John Walter Friend, of Freemantle, Southampton, chronometer maker. An improved meter for registering the flow of water and other liquids.

2040. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and patent agent. Improvements in motive power engines. A communication from P. and L. Larochette, of Paris.

2041. Nicolas Saintard, of Paris, doctor. An improved break for railway and other carriages.

2043. Joseph Ridsdale, of the Minories, nautical brass founder. An improvement in ships' scuttles.

2045. Benjamin Richardson, of Wordsley Glass Works, near Stourbridge. An improvement in the manufacture of articles in glass, so as to produce peculiar ornamental effects.

2046. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in apparatus for retarding and stopping carriages on railways. A communication.

2047. James Henry Bennett, of Birmingham, mechanic. Improvements in engines to be worked by atmospheric pressure or steam, or by both in combination, and also in steam generators to be used therewith.

2048. Patrick Danvers, of New York, and George Whitfield Billings, of Plainfield, New Jersey. An improved means for rolling hoops and wheel tyres.

Dated July 28, 1857.

2049. James Higgin, of Manchester, manufacturing chemist. An improved method of drying garancine or other moist substances.

2050. William Stettinus Clark, of High Holborn. Improvements in automatic feeding printing press. A communication from S. W. Wood and H. A. Bills, of the United States.

2051. Edward Hallen, of Cornwall-road, Lambeth, civil engineer. Improvements in the construction of bedsteads and similar articles to recline or sit on.

2052. Octavius Henry Smith, of the Thames Bank Distillery. An improvement in supplying steam to water to heat the same, and in preventing what is technically called priming of steam.

2053. William Hirst, of Bath. Improvements in manufacturing felted fabrics.

2054. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in apparatus for feeding water to steam boilers. A communication.

2055. Prosper Brunot, of Paris, merchant. Improvements in springs for petticoats and other articles of dress.

2056. Robert Jackson, of Glasgow, gentleman. Improvements in protecting certain parts of the body from disfigurement by cutaneous diseases.

2057. William Proctor, of Bristol, manufacturing chemist. Improvements in the manufacture of sulphuric acid.

2058. Edward William Baxter, of Sydney-street, Mile End, writer on glass. An improved mode of preparing glass labels, advertising tablets and ornamental devices upon glass.

2059. Jules Dortet and André Barthelemy Denis, of Paris. An improved safety padlock.

2061. Thomas Till and William Gardiner, of Birmingham, machinists. An improvement or improvements in preventing collision on railways.

2062. John Clay, of Birmingham, saddler. An improvement or improvements in saddles.

2063. John Bethell, of Parliament-street, Westminster, gentleman. Improvements in the construction of ships and other vessels.

Dated July 29, 1857.

2065. John and Daniel Bertwistle, both of Padiham, Lancaster, joiners. Improvements in ventilating.

2067. Samuel Lawrence Taylor, of Cotton-end, Bedford, machinist. Improvements in steam engines.

2069. William George Plunkett, of Dublin, gentleman. Improvements in the application of new materials to the manufacture of paper pulp and yarn for textile fabrics, cordage, &c.

2071. Jonathan Burnett, of Newcastle-upon-Tyne. Improvements in the manufacture of chloride of lime or bleaching powder.

Dated July 30, 1857.

2073. James Purcell, of Mount-street, Whitechapel-road, tailor. Improvements in attaching or securing buttons to articles of clothing.

2075. William McKinley and Robert Walker, of Paisley. An improvement in the manufacture of moulds for forming the soles of boots and shoes.

2077. John Frearson, of Birmingham, mechanical engineer. Improvements in feeding, cutting, shaping, and piercing metals.

Dated July 31, 1857.

2079. James Alfred Limbert, engineer, Royal Navy. Improvements in marine engines.

2081. Luke Cooke, of Blackburn, manager. Improvements in machinery or apparatus for preparing cotton, wool, or other fibrous substances to be spun.

2083. Thomas Forsyth, of Manchester, engineer. Improvements in and applicable to slide valves for steam engines. A communication.

2087. Henry Genhart, armourer, of Liége. An improved apparatus for cleaning and sharpening knives, and cleaning spoons and forks.

2089. George Inman, of Susannah-street, Poplar, joiner. An improved construction of locomotive engine.

Dated August 1, 1857.

2091. William Jewett Harris, of Greenwich, cabinet maker. Improvements in the construction of dining and other tables.

2095. James Tatlow, of Wirksworth, Derby, manufacturer, and Henry Hodgkinson, also of Wirksworth, engineer. Certain improvements in railway breaks and signals.

2097. Thomas Rickett, of the Castle Foundry, Buckingham. Improvements in implements for cultivating land.

2099. Augustin Julien Michel Ramar, of Broad-street, Golden-square. Improvements in ornamental and portable fountains.

2101. George Brooks Pettit and Henry Fly Smith, of Oxford-street, gas engineers. An improved cap or cover for the glasses of gas and other lights.

Dated August 3, 1857.

2103. Robert Davison, manager, and James Lee, overlooker, of Limerick. Improving the edge or selvage of linen, cotton, woollen, silk, or any other cloth or fabric, while in the act of weaving.

Dated August 4, 1857.

2105. Leon Duriez, jun., of Paris. An improved apparatus for stopping horses.

2107. Eugène Antoine Dumergue, of Paris. A new description of fringes.

2109. Peter Macpherson, of Edinburgh, agricultural implement maker. Improvements in wheeled carriages or vehicles.

2111. Charles Iles, of Birmingham, manufacturer. An improvement or improvements in the manufacture of thimbles.

2113. William Colborne Cambridge, of Bristol, agricultural implement maker. Improvements in press wheel rollers or clod crushers.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," August* 18*th*, 1857.)

935. J. Bourne. The generation and application of motive power.

957. T. Melling. Improvements in taps or valves, and in apparatus to prevent the overflowing of and letting off the water from baths.

965. C. Goodyear. An improved manufacture of waterproof fabric, applicable as a substitute for leather, prunella, embroidered, and other ornamental fabrics and stuffs.

966. C. Goodyear. Improvements in the manufacture of waterproof boots and shoes, applicable

also in part to boots and shoes of other kinds, and to other outer coverings for the feet.

974. G. Pearson and E. Jessop. Improvements in sewing machines.

980. H. Brierly. Improved mules or machinery to be used in spinning.

984. R. K. Bowley. Certain improvements in boots and other similar coverings for the feet.

989. E. Edwards and E. Beacher. Improvements in machinery or apparatus for washing or cleansing mineral and other substances.

992. J. W. Rogers. Improved means of, and apparatus for, collecting for use the excrement of towns and villages, and for facilitating the drainage of houses generally.

997. J. Harland. Purifying plastic clay used for the making of all kinds of earthenware, and for the cheaper and more expeditious manufacture of bricks, tiles, draining pipes and other articles of clay of a similar nature or description.

1003. E. P. Alexander. Improvements in the manufacture of fulminating powder. A communication.

1006. G. E. Taylor. An improvement in raising and shearing cloths.

1010. J. Leach. Improvements in looms for weaving.

1012. J. C. Haddan. Improvements in the manufacture of, and in the means of and apparatus for discharging projectiles.

1013. J. C. Haddan. An improvement or improvements in the smelting and refining of iron. A communication.

1016. W. Smith. A universal Jacquard apparatus. A communication.

1017. J. Marron. Improvements in machinery or apparatus for manufacturing bolts, rivets, nuts, and other similar forgings.

1024. R. A. Brooman. Improvements in the distillation and rectification of spirits, in apparatuses employed therein, and in the preparation of the substances to be distilled. A communication.

1026. W. G. Wiles. Improvements in brewing.

1028. T. N. Pengelly and G. Porter. Improvements in the application of steam to lifting or hoisting coals and other goods from ships' holds.

1035. J. Maurice. Certain improvements in the fastenings, fixings, and attachments, used for supporting or securing artificial teeth in the mouth.

1038. C. Goodyear. Improvements in the manufacture of life-preserving apparel and other buoyant, pliant, articles.

1046. P. McFarlane. Improvements in looms for weaving.

1047. J. Ramsbottom. Improvements in wrought iron railway chairs, and in machinery for manufacturing the same, and other articles.

1060. W. E. Newton. Improved means of lighting gas for illuminating and other purposes. A communication.

1065. A. V. Newton. Improved apparatus for taking the measurements for coats and other garments. A communication.

1066. C. Goodyear, Jun. An improved manufacture of paper knife.

1070. J. Safran. Improvements in locking or fastening combinations of drawers in chests, tables, nests, or otherwise.

1080. J. Warburton. Improvements in preparing and combing wool and other fibres.

1082. J. Warburton. Improvements in carding machinery.

1084. J. Warburton. Improvements in preparing and combing wool and other fibres.

1087. G. Schaub. A new or improved manufacture of types for printing.

1088. E. Oldfield. Improvements in self-acting mules for spinning and doubling. Partly a communication.

1090. J. M. L. Caillaud. Improvements in removing the fur from the skins of rabbits, and in preparing rabbit, calf, and other skins for tanning.

1102. C. R. Barnes. Improvements in means for hulling and cleaning rice and other grains having a hull or husk.

1103. C. B. Normand. Improvements in generating motive power by the employment of heated air, steam, and gases.

1116. H. Wimball. Improvements in pug mills

1132. E. Marten. Improvements in apparatus for regulating the pressure and supply of gas.

1145. D. Milnes. An improved manufacture of woven goods or fabrics.

1160. W. Clark. Improvements in machinery or apparatus for embroidering. A communication.

1162. T. Craddock. Certain improvements in the steam engine and the steam boiler.

1187. T. D Rotch. Certain new and useful improvements in gas generators. A communication.

1215. B. Barcroft. Improvements in dyeing and printing.

1328. C. Hall and T. Charlton. Improvements in agricultural engines and implements used therewith for ploughing and cultivating the soil.

1362. D. Hesse and M. Hesse. Certain improvements in the manufacture of shirts, shirt fronts, and other articles of wearing apparel.

1409. J. W. Burton and G. Pye. An improvement in pressing and crushing flax, hemp, and other fibrous substances.

1420. L. Lethuillier. Improved machine for moulding and compressing bricks, tiles, and other articles made of soft materials.

1459. T. Silver. An improved steam engine governor.

1542. L. L. Bequemie. Improvements in cocks. A communication.

1749. R. Shaw and J. Robinson. Improvements in machinery for preparing cotton and other fibrous materials.

1802. S. Gaudrion. An improvement in screw propellers. A communication.

1863. T. Royds, T. Roscow, and J. Lord. Improvements in lifting heavy bodies under certain circumstances, such as minerals or other substances, from mines to the surface of the earth, or from one story of an edifice to another, and in machinery or apparatus to be used for such purposes.

1924. W. E. Newton. Improvements in the construction of furnaces and steam boilers. A communication.

1934. J. Loach, J. J. Salt, and B. Day. Certain improvements in metallic air-tight coffins, as also in the mode of covering, finishing, and ornamenting such like coffins.

1968. G. Walker. Improvements in looms for weaving.

1990. J. Austin. Improvements in machinery or apparatus for ploughing or cultivating land.

2008. J. C. Arnall and G. Greenhow. Improvements in the manufacture of glass bottles and jars, and in the apparatus connected therewith.

2012. W. E. Newton. Improved machinery for manufacturing screws or screw caps of sheet metal. A communication.

2059. J. Dortet and A. B. Denis. An improved safety padlock.

2075. W. McKinley and R. Walker. An improvement in the manufacture of moulds for forming the soles of boots and shoes.

2077. J. Frearson. Improvements in feeding, cutting, shaping, and piercing metals.

2081. L. Cooke. Improvements in machinery or apparatus for preparing cotton, wool, or other fibrous substances to be spun.

2109. P. Macpherson. Improvements in wheeled carriages or vehicles.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1758. Walter Blundell.

1760. John Gibson.

1764. George Weston.
1765. John Benjamin Daines.
1771. William Todd and Jacob Todd.
1773. Henry Smith.
1776. Benjamin O'Neale Stratford, Earl of Aldborough.
1777. John Norton.
1788. William Burgess.
1789. William Siddons.
1809. Julian Bernard.
1812. Peter Armand Lecomte de Fontainemoreau.
1816. Samuel Kershaw and James Taylor.
1831. James Worrall, jun.
1911. Peter Armand Lecomte de Fontainemoreau.
1922. Thomas Craddock.

LIST OF SEALED PATENTS.

Sealed August 14, 1857.

445. William Cooke.
464. Harby Barber.
480. Samuel Dyer.
483. George Frederick Lee Meakin.
484. David Lloyd Price.
491. Henry Young Darracott Scott.
524. James Brown.
569. Brook Hodgson and John Carter.
1571. Cherie Martel.
1612. John Gedge.
1625. Griffith Jarrett.
1643. William Wilkins.
1727. Henry Dunington.
1731. Lockington St. Lawrence Bunn.

Sealed August 18, 1857.

479. David Cheetham.
481. Louis Léon Foucher.
495. Edward Edwards.
498. John Rowland Crook.
502. Wilhelm Zipser and Johann Peter Klein.
512. John Middleton and William Stent.
516. Michael Grouse.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1777.] SATURDAY, AUGUST 29, 1857. [PRICE 3D.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

COTTON'S TILT AND OTHER HAMMERS.

COTTON'S TILT AND OTHER HAMMERS.

MR. SAMUEL COTTON, of Broughton, near Manchester, has lately obtained a patent for "An improved mode or method of regulating or governing lift, tilt, or other hammers," which improvement relates to working hammers by means of cams, eccentrics, tappets, friction, or other mechanical arrangements, and consists in regulating or governing the force of the blow, by employing a piston working in an air cylinder, the interior of which is somewhat longer than the length of the stroke of the hammer and the depth of the piston, the cylinder having lids or covers, the lower one being furnished with a stuffing box, through which the piston rod connected to the hammer passes, and the upper one being perforated with holes, which are covered or closed when required by a valve, connected to a spindle passing through the centre of the lid, a spring being fixed around the spindle for the purpose of closing the valve at each return stroke of the piston.

The engravings, on the preceding page, represent a front view and sectional elevation of a lift hammer, according to these improvements; A, is the main standard or frame of the machine, *b*, the guides which guide the hammer, *c*, vertically, being lifted by the cam, *d*, which acts on the antifriction roller, *e*, mounted on the pin or stud, *f*, in the upper part of the hammer. The cam, *d*, forms part of or is made fast to the shaft, *g*, which carries the fast and loose pullies, *h*, and the fly wheel, *i*, the shaft, *g*, being actuated by a driving belt or other suitable means. Connected to the main standard or frame, *a*, is the cylinder, *k*, furnished with lids or covers, the lower one, *l*, having a stuffing box, *m*, and the upper one, *n*, being perforated with holes. Within the cylinder is the air-tight piston, *o*, forged to or forming part of the piston rod, *p*, which works through the stuffing box, *m*, and is made air-tight by rings of metal in conjunction with vulcanized india-rubber. The piston, *o*, is kept air-tight in the cylinder by the two metal rings, *q*, which are pressed against the interior of the cylinder by the india-rubber ring or spring, *r*. On the top of the piston there is also a cup-shaped leather packing, *s*, held fast to the piston by the plate, *t*, which is screwed on the top of the piston, a pin being employed to prevent it turning. The hammer, *c*, is connected to the piston by a T-shaped head, forged to and forming part of the piston rod, fitting a corresponding space in the top of the hammer. At the underside of the upper lid or cover, *n*, is a valve, *u*, covered with vulcanised india-rubber; the valve being connected to the spindle, *v*, around which is the spring, *w*, for the purpose of closing it at each return stroke of the piston. The top of the valve spindle, *v*, is connected by the wing nut, *x*, to the cross lever, *y*, working in the joint, *z*, thereby allowing the lever to move up and down with the valve, the other end of the lever, *y*, being furnished with a screw and nut for the purpose of regulating its position. The upper and lower ends of the cylinder are furnished with the cocks a^1 and b^1, each of which is in communication with two air-tight flap valves, made of vulcanised india-rubber or other suitable material, one valve opening inwards, and the other outwards; the ingress valves are shown at c^1, d^1, and the egress ones, at e^1, f^1. The cocks are connected by a rod or spindle g^1; the upper part of the top cock is cut with a scroll or thread, corresponding with the nut h^1, working upon it and under the end of the screw in the cross lever, *y*. To the lower cock is connected the rod, k^1, to which a lever or handle, l^1, is made fast for the purpose of altering the position of the aperture in the cocks. In the main frame is a space or groove for the gag or shot bolt, m^1, acted upon by the lever or handle, n^1, which presses the shot bolt in the groove or recess cut in the side of the hammer, so that the hammer can be held up when not required to work.

Instead of the nut, h^1, a slice or wedge cam may be placed on the top of the spindle, above the cocks, for the purpose of raising the cross lever, *y*. An external valve may also be employed for covering the holes in the upper cover of the cylinder, unless lifted off by the rods or joints, *x*, connected to the cross lever. In this case the internal valve, *u*, is at liberty, being merely held up by a spring, which gives way when required. In this arrangement the concussion of the blow causes no unnecessary strain on the cocks.

In the figures the hammer is shown at its highest position, and on the point of falling. The operation of the hammer having the improved regulator or governor is as follows:— When the driving shaft, *g*, is put in motion, the cam, *d*, is carried round; the gag or shot bolt, m^1, is then withdrawn, liberating the hammer, *c*, ready for work. If the handle, l^1, be moved towards the right hand, the cocks will be turned, the aperture of the lower cock, b^1, being opened to the outlet valve, f^1, thereby allowing the air to escape from the under side of the piston, *o*, and the aperture of the upper cock, a^1, will be opened to the inlet valve, c^1, allowing the air to enter between the piston and the top cover, *n*, of the cylinder. The internal valve, *u*, is liberated (so that it may act freely) by the scroll on the spindle above the cocks, acting in the nut, and releasing the cross lever, *y*, or by raising the cross lever, *y*, and the external valve, by the wedge or slice cam (as before described) the hammer will then descend and with it the piston, which forces the whole or a great portion of the

air from the underside of the piston, through the outlet valve, f^1, the external air passing at the same time through the upper inlet valve, c^1, and the aperture of the upper cock, a^1, to the space between the upper lid of the cylinder and the piston, the concussion of the blow drawing down the internal valve, and allowing the cylinder to be filled with air when deficient. When the cam, *d*, comes in contact with the antifriction roller, *e*, it will lift the hammer, *c*, the piston rod, *p*, and the air-tight piston, *o*, thereby compressing the air in the upper portion of the cylinder, and at the same time forming a suction or vacuum in the lower part of the cylinder, between the lower lid and the piston. The air being confined in the upper part of the cylinder by the inlet valve, e^1, and the internal valve, *u*, which closes from the inside as soon as the piston commences to ascend, causes the compression, and the lower outlet valve being closed by the pressure of the atmosphere, causes the suction or vacuum; consequently when the cam has lifted the hammer to its highest position and turned the centre of the roller, the hammer is liberated and its descent accelerated by the combined action of the expansive force of the compressed air in the upper part of the cylinder and the suction or vacuum in the lower part, the force of the blow being greatly increased thereby. When it is desired to strike a blow of less weight than above described, the handle, l^1, is drawn to the left hand; the scroll or thread on the spindle of the upper cock raises the nut, h^1, and the cross bar, *y*, thereby closing the internal valve, *u*. By the modification previously described, the cross lever, *y*, is allowed to descend, and with it the external valve, which covers the holes in the upper lid of the cylinder, through which, in either case, no air can enter by the aperture in the cover to the upper portion of the cylinder, (the flap valves and cocks then being alone in action;) there will consequently be less air to be compressed, and therefore less expansive force given to the blow of the hammer. If a lighter blow than the weight of the hammer is required, the handle, l^1, must be drawn more to the left hand, by which the upper cock, a^1, is partly closed to the aperture of the upper inlet valve, c^1, and opening to the aperture leading to the outlet valve, e^1, causing a less quantity of air to be admitted in the upper part of the cylinder; at the same time the air passage leading from the inlet valve, d^1, through the lower cock is increased, and the passage to the outlet valve, f^1, decreased, thus retarding the air in its escape from the underside of the piston, thereby forming a kind of cushion or resistance to the piston, and decreasing the weight of the blow. To allow the hammer to remain at the top during the setting or moving of the article to be operated upon, the handle, l^1, must be drawn still more to the left hand, at about right angles to the frame or main standard; the thoroughfare of the lower cock is then wide open to the aperture of the inlet valve, d^1, and closed to the aperture of the outlet valve, f^1, the lower portion of the cylinder being thereby filled with air, forming a cushion for the piston to sit upon; at the same time the thoroughfare of the upper cock being closed to the aperture of the inlet valve, c^1, and opened to the aperture of the outlet valve, e^1, which closes immediately the piston ceases to rise, thereby preventing the ingress of air in the upper portion of the cylinder, by which means the effect of the cushion of air below the piston effectually holds the hammer up. By the use of the aforesaid arrangements it is evident that any required variation of force in the blow or successions of the same weight of blow, can be obtained without difficulty.

STEAM-SHIP PERFORMANCE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—A formula of a simple approximate character, by which to test the performances of steam vessels, has long been a desideratum with practical engineers and shipbuilders. If certain data, and the effective or indicator horse-power of the engines be given, it is very desirable to have some rough rule by which it may be determined what speed ought to result; or, the same data and a desired speed being given, what ought to be the effective or indicator horse-power of the engines. I say *rough rule* because mathematical precision is neither practicable nor necessary.

Various formulæ have been devised, but they will neither bear the analysis of the mathematician, nor accord with the experience of the engineer. One of these has maintained some repute,—namely,

$$\frac{V^3 D^{\frac{2}{3}}}{I\ H\ P} = C$$

in which V = velocity; D = displacement; I H P = indicated horse power; and C a co-efficient varying according to the dynamic merits of the vessels to which the formula is applied. But as this formula takes cognizance only of *displacement*, its insufficiency is manifest; for the immersed portion of a ship may approximate to a prismatic, cylindrical, or parabolic form, and the resistance vary considerably with the

same amount of displacement; or displacement may be kept constant and resistance indefinitely diminished or increased by varying length. A long vessel, with the same displacement as a short one, must sustain less resistance. Still *displacement* must be an essential element of any formula for practical use, for no test of the capability of a steam ship can be of any dynamic or commercial utility which ignores the weight of the mass operated upon.

The area of the immersed midship section has been employed as the measure of resistance. And one person seems to imagine that water is composed of *inseparable* liquid basaltic columns, and that the line of motion of any steam vessel must be regarded as parallel to the axes of these columns; although experience, common sense, and scientific investigation all concur in proving that resistence depends more upon the form of the fore and after bodies of ships than upon the magnitude of the area of the greatest transverse section. If the areas of the midship sections of all the steamers in this port were sent to 166, Fleet-street, and the areas of a cross section of each of their funnels, and you had access to no other data, you might infer the resistance of the vessels as well from one set of areas as from the other.

The "RESISTANCE" encountered by a floating body moving through water is of a very complex character. There is the inertia and molecular cohesion of the fluid; the want of counter-pressure at the posterior portion, arising from the body leaving a sort of vacuum behind it, in consequence of the fluid closing upon the after body, in accordance with unvarying hydrostatic laws, whatever the velocity of transit may be; the friction of the fluid against the asperities upon the immersed surface; atmospheric resistance to the parts of the body above the water, &c. Now all these may be materially modified by the form of the body; and a rigorous investigation of the whole subject would be, perhaps, the most subtle and profound problem ever proposed to the mathematician.

Even before any progress can be made in excogitating the "rough" practical approximate formula referred to, there is one important point now disputed which must be preliminarily settled. On the one hand it is contended that resistance varies as the square of velocity, and the power expended varies in the same ratio; on the other hand, it is argued, if resistance varies as the square of velocity, power expended must vary as the cube of velocity. Both parties reason correctly, but there is a fundamental difference in their estimate of resistance. This will be best understood by contrasting the view taken by Sir Isaac Newton and his followers with that taken by Tredgold and engineers generally.

Newton's theorem was thus expressed by him:—"*The motions communicated to the fluid, and therefore the motions lost by the body,* IN EQUAL TIMES, *are as the squares of the velocities.*" Tredgold says:—"Resistance $= V^2 (1{\cdot}5\, a + l\, c\, F)$ and the power required is as the force and velocity $= V^3 (1{\cdot}5\, a + l\, c\, F)$." The expression in the vinculum is the result of a previous process of reasoning, but there is no reason whatever given for the jump from V^2 to V^3, except that the power required is as the force and velocity. Another writer, himself a practical engineer, states, "That to double the velocity of a steam vessel will require four times the amount of tractive force, and as that quadrupled force must act through twice the distance in the same time, an engine capable of exerting eight times the original power will be required."

A fundamental divarication between the conceptions of the philosopher and those of the engineers is here conclusively apparent. Newton clearly meant that the amount of force developed during any finite portion of time, and through a doubled space, was as the square of the velocity. The "square theory" accords with this. But the engineers regard the force of the impact or pressure against the water as quadrupled by a double velocity, and as a double quantity of water has to be pressed through with this force in the same time, the expenditure of power must be eightfold.

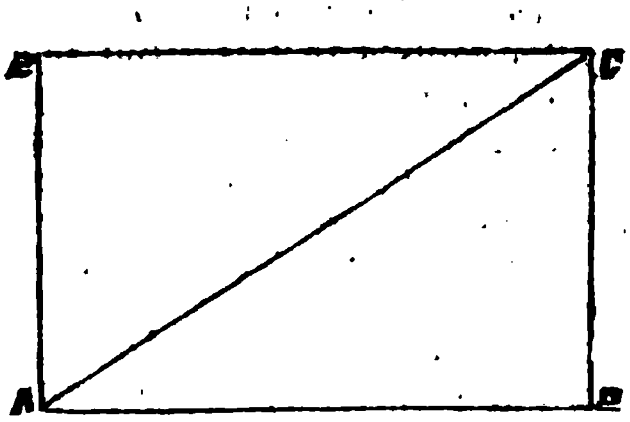
The point at issue, then, is clearly nothing more nor less than one phase of the question which caused so much quarrelling between the mathematicians of England and those of the continent during many years of the last century.

With some hesitation I venture to say that the question is in effect no more than this: *Is the force of a body in motion as its velocity merely, or as the square of its velocity?* If the former, the square theory would appear to be valid; if the latter, the cube theory would certainly be demonstrable.

A popular writer on the steam engine and steam navigation has evinced considerable acumen and frankness in this matter. I refer to Mr. Bourne. He perceived that the cube theory must be based upon the assumption of force being as the square of velocity, and he, in plain terms, states this to be the fact, and his reasonings in support of the cube theory have a coherence and consistency which they could not possibly have if based upon any different hypothesis.

But *is* the force of a body in motion as the square of its velocity, or as its velocity merely? The question is not as to what

force may be "stored" in the body, but what is it capable of mechanically developing in a definite time. We must not step out of the precincts of mechanics and mathematics into the region of metaphysics while examining this proposition. Dr. Desaguliers very pertinently referred to the lever balance; a pound at two feet from the fulcrum, and two pounds at one foot from it, are not only equipoised, but they may be made to oscillate through very large arcs, those on one side of the fulcrum being twice as large as those on the other, and the velocity in the same ratio; still the weights return to equilibrium. In some practical experiments bodies having a twofold velocity have produced effects which have been fourfold, but those effects have invariably been produced in a double time. Atwood's machine showed clearly that the same amount of force would impart a velocity in proportion to itself, and inversely proportionate to the weight of matter acted upon. And I cannot avoid thinking that if 33000 lifted one foot high in a minute is a horse-power, that 33000 lifted two feet high in a minute must be deemed *two* horses-power only, although the square theory would make it *four*.



There is no fact in dynamics more axiomatic than the following:—Let A, B, C, D be a parallelogram, and the intensity of a force acting in the direction A B=3 that of another force acting in the direction A D, be=4. Then their resultant will be a force in the direction of A C=5. And experience has verified, without exception, the fact that, if a body be at A, the two forces, A B and A D, will, if they co-operate, urge the body to F in the same time that A B would urge it to B, and A D would urge it to D. And Euler demonstrated that, whether those forces acted together or successively, the same result would take place. But if these two forces be measured by the squares of the velocities they generate, then the value of A B would be $3^2=9$, and the value of A D would be $4^2=16$. Now, if these two forces *acted simultaneously in the same line* we should have an amount of force as $9+16=25$; and force being as the square of velocity, according to the hypothesis under examination, we should have $\sqrt{25}=5$ as the velocity these forces would produce. But we have already seen, and experience proves, that that velocity would be produced by the two forces *acting in a direction at right angles with each other*, when the body would move in a diagonal direction, its velocity being = 5. The value of the forces cannot, therefore, be as the squares of the velocities they produce.

I do not attach much importance to experiments with small models in a fluid, or with a plane pulled through water by a weight suspended over a fixed pulley; but as far as I have experimented myself, and as far as I have made myself acquainted with the experiments of others, I have found that a double velocity (or nearly so) has invariably resulted from increasing the weight fourfold. Now all writers on dynamics agree (and, indeed, it is obvious) that a force equivalent to the gravity of a falling weight, acting upon a mass of matter, will generate a velocity which is *directly* as the weight, and *inversely* as the quantity of matter. Thus, if a fourfold weight is found to cause a double velocity, the quantity of matter is known to be no more than *double*. So that the resistance to the immersed plane, moving at a double velocity with a fourfold weight, is the equivalent of the resistance of a twofold amount of inertia; although no less amount of force than a fourfold amount would produce the double velocity. It is certain that a fourfold force would only produce the original velocity upon a quadrupled mass of matter.

In *pneumatics* we find that velocity is produced by gravity or any force inversely as the density of the atmosphere. To illustrate this subject, then, suppose the density of the water to be quadrupled, this would cause a literal and absolute fourfold resistance to the plane. In this case a quadrupled weight would produce no increase of velocity, and a fourfold expenditure of power would take place in the same space. If the density were doubled, an increased velocity must result from a quadrupled weight; for if f= impinging force, v= velocity, d= density, and w= weight, then $f\,v\,d=w$. But f and v are both alike (for force is as velocity), consequently v^2 may be substituted for $f\,v$, and we have $v^2d=w$ or $\frac{w}{d}=v^2$. Now, weight being 4 and density 2, the result is

$$\frac{4}{2}=2=v^2 \text{ or } \sqrt{2}=v.$$

That is, a quadrupled weight will pull the same plane through a fluid of double density with a velocity increased from 1 to about 1·414. Here, then, resistance is $1·414\times2$, in the same sense as the *resist-*

ance of the fluid twice as dense is 4. Taking the normal density of water, we must put

$$d = 1 \text{ and } \frac{w}{d} = v^2 \text{ or } 4 = v^2 \text{ and } v = 2.$$

That is, the velocity will be doubled. The three resistances stand thus:

Density.	Resistance.	Velocity.
4	4	1
2	2·818	1·414
1	2	2

So that the resistance *from the density of the fluid* is only double at a double velocity. It will be observed that the term "weight" in the above does not mean literally a falling weight, but the *force of a falling weight merely*. In actual experiments the weight used absorbs part of the force of gravity.

If this view of the case is correct, resistance is as the square of velocity, because the motive force has to urge the plane through a double length of fluid in the same time, and that causes the same amount of resistance as if that double length of fluid were condensed into half the space. This comports exactly with Newton's view of the case, but is not reconcilable with that taken by the engineers. They affirm that the initial resistance for a double velocity is fourfold, and therefore as a double space is passed through in a given time, the expenditure of power in the same time is eightfold; which is tantamount to saying that a pressure of a given amount or intensity will expend power in proportion to the space through which it is exerted irrespective of the resistance it encounters: this, as we shall see, is contrary to the above reasonings and to experience.

Steam is elastic, and the velocity of the piston, with the elasticity of the force, keep up an equilibrium between the work inside the cylinder and the work performed outside of it; and the diagrams of the indicator, with the velocity of the piston, are pretty accurate data for the guidance of the engineer; but the matter under discussion is utterly different.

It may be presumed that the same amount of propelling pressure upon the water will be kept up by the same expenditure of steam power in the same time. And this pressure may be ascertained by a dynamometer at the inner end of a screw shaft. *The pressure then would be in proportion to the power expended.* But if a vessel be propelled by it through fluids varying in density as 1, 2, 4, we have seen the space passed through in the same time would be as 2, 1·414, and 1. How can the expended power be measured by the space passed through? Again, the facility for passing through the fluid which three vessels may have may be as 1, 2, and 4. The same pressure would urge the first through 4 miles per hour, the second through 5,656 miles per hour, and the third through 8 miles per hour. How, then, if the pressure be as the steam power expended, can it be said that that power is to be ascertained by multiplying the pressure into the space through which it is employed?

In the case of a level railway, assuming the coefficient of friction to be $\frac{1}{280}$, or constant resistance, at all velocities, if we double velocity, we must double the power expended in the same time. We must double the pressure. Here, then, is a double pressure acting through a double space in the same time; yet nobody thinks of making the fraction $\frac{1}{280}$, $\frac{1}{140}$, or of deeming the resistance 16 lbs. per ton, instead of 8 lbs., or of reckoning the power expended in an hour as any more than double, although the driving pressure must be double to afford the double velocity.

Again, if the railway have an ascending gradient of, say, 1 foot in 280, then we should say $\frac{1}{280}+\frac{1}{280}$, or $\frac{1}{140}$ would be the coefficient of resistance; there would be an *actual* increase of resistance, and twice as much power would be expended upon the same length of rail in the same time. With this gradient make the weight of the train double. The resistance would then be fourfold, but a fourfold pressure would give no increase of velocity. But if the pressure upon a steam vessel be quadrupled, a double velocity results; and as this would take place on a railway, if we doubled the weight of the train, or made resistance double by its acclivity, it is evident that the resistance to the steam vessel is not *absolutely* fourfold as an initial impediment to motion, but is equivalent to the resistance sustained by a train when its weight is doubled and the power of the engine quadrupled, its speed being doubled also.

And as the power expended by such a train would be only fourfold during an hour, although the space passed through is double and the pressure quadrupled, so with the steam vessel it would seem that the power expended can only be fourfold in the same time, although the pressure upon her screw shaft may be quadrupled, and the space be doubled also. Thus power would be expended in the ratio of the *squares*, and not of the cubes of velocities.

I am, Gentlemen, yours, &c.,

NAUTICUS.

[We give insertion to the letter of "Nauticus," because it is written in a spirit of candour and modesty, and probably very

fairly represents the opinions of several well meaning persons who are dissatisfied with any formula based on the supposition that the indicated horse-power used in propelling a vessel varies as the cube of the velocity. We shall endeavour, in the few remarks we shall offer, to remove the difficulties on this matter which "Nauticus" so strongly feels. The objections urged by "Nauticus" against employing displacement raised to the power of ⅔rds and midship section are fair enough. As a sole test of the locomotive merits of a ship, neither of the formulæ

$$\frac{V^3 D^{\frac{2}{3}}}{I H P} = C, \text{ and } \frac{V^3 \text{ midship section}}{I H P} = C$$

can be maintained.

Assuming, for the present, that resistance varies as the square, and consequently power as the cube of the velocity, it is very evident, that in any formula which professes to give the relation between these elements, the cube of the velocity must be compared with the indicated horse-power, nor can any other *form* of relation between them be admitted. The question, then, is limited to the use of $D^{\frac{2}{3}}$ and midship section.

Now, it may be assumed, as in accordance with experience in actual shipbuilding of late years, that a given vessel may be divided into two, and a new portion introduced into the middle, the form of the bow and stern remaining unaltered, and the ship thus altered will be propelled at the same velocity with the same horse-power very nearly, (the only difference being a slight increase due to the increase of friction on the sides of the vessel), as the unaltered vessel. Here is a case, then, in which the midship section and the form of bow and stern remaining unaltered, but the displacement being greatly increased, the horse-power and velocity remain unaltered. Suppose D_1 and D_2 are the two displacements. Now

$$\frac{V^3}{I H P}$$

is the same for both these vessels; but in a commercial point of view the latter is more valuable than the former, in the proportion, at least, of $D_2 : D_1$.

Again, the displacement remaining the same, the resistance of the vessel varies as the midship section multiplied by some factor depending on the form of the vessel at bow and stern, so that the resistance may be supposed $= f A v^2$, A being the midship section of the factor we have supposed: in this case, we should have

$$\frac{f A v^3}{I H P} = C,$$

where C is absolutely constant, and if f' and A' were values of f and A for a screw vessel

$$\frac{f' A' v^3}{I H P} = C;$$

whence

$$\frac{A V^3}{I H P} : \frac{A' v^3}{I H P} :: \frac{C}{f} : \frac{C}{f'}$$
$$:: C_1 : C_2$$

In this case

$$\frac{A V^3}{I H P} = C,$$

where C varies for different ships, seems to give a fair scientific test of the locomotive merits.

From these considerations, it would appear that, supposing the form of a vessel to vary, A being the midship section,

$$\frac{A V^3}{I H P} = C,$$

C being constant for same vessel, but differing for different vessels, is a fair standard of comparison. Again, midship section and form of bow and stern remaining the same, but D varying, the value of the vessel in a mercantile point of view considered, or carrying cargo with a given velocity and horse-power, varies as D, from which we should be inclined to deduce the co-efficient $D \times C$, as fairly representing the dynamic merit of the ship, C being deduced from the formula

$$\frac{A V^3}{I H P} = C.$$

The objections, however, of "Nauticus" are mainly raised to the use of the cube of the velocity. "Nauticus" conceives that Newton's statement of his theorem, viz., "*The motions communicated to the fluid, and therefore the motions lost by the body, in equal times, are as the squares of the velocities,*" favours the square theory; and that engineers, who have, by the bye, only adopted the theory of mathematical writers on this subject, by assuming that resistance varies as V^2, have fallen into error, and placed themselves in opposition to Newton.

In seizing upon this theorem of Newton, and extracting from it the meaning "that the amount of force *developed* during any finite time, AND THROUGH A DOUBLED SPACE, is as the square of the velocity," "Nauticus" has quite mistaken Newton's mode of expression, and has completely overlooked the use which he makes of the law propounded in this theorem. The "Motion" of Newton is momentum or moving force; the dynamical equivalent of pressure. As in all motion time is an element, and in cases of mutual action *equal times* must be made the standard for comparison of mo-

menta added or subtracted, and in the case in question the assumption of space through which motion has been made is entirely gratuitous on the part of "Nauticus," our readers will have no difficulty in seeing that Newton had no reference to the product of force and space passed over, but simply to the momenta generated, &c., and destroyed in equal times, that is, to the forces alone. Moreover, all Newton's subsequent investigations, including the determination of the surface of least resistance, are built upon the law that the resistance itself varies as the square of the velocity. "Nauticus," therefore, must not claim Newton's authority for the view which he advocates.

The issue to which "Nauticus" brings the question, and which he very properly does with some hesitation, is quite beside the question, viz., "*Is the force of a body in motion as its velocity merely, or as the square of its velocity?*"

We will overlook some ambiguity in this expression, and presume that "Nauticus" means by "force of a body in motion" the force which, applied instantaneously to it opposite to its direction of motion, would destroy its motion. Undoubtedly, in this case, the force so understood is represented by the product of the mass of the body and its velocity. But what has this to do with the case? When a body moves through water, it does not displace or act upon the *same mass* at all velocities, but a mass which increases with the velocity. If w be the weight of water to which motion (supposed to be uniform) is communicated at velocity of unity; then $w v$ is the corresponding mass at the velocity v, and then

$$\frac{wv}{g}\times v, \text{ or } \frac{w}{g}v^2$$

represents the momentum communicated to this mass, and therefore lost by the body; that is, the resistance

$$=\frac{w}{g}v^2,$$

or varies as v^2.

"Nauticus" is quite right in supposing that 33,000 lbs. raised two feet high in a minute must be deemed *two* horses power; but by what train of argument he has arrived at the conclusion that "the square theory would make it *four*," we are at a loss to conceive. It is when we deal with resistance of water only that the law of the square of the velocity is required.

A very large portion of "Nauticus's" remarks needs no comment; for the question is not whether the proper measure of a force be the square of the velocity generated by it (which it certainly is not), but whether the resistance offered by water to a plane moving in it with a certain velocity be as the square of the velocity, than which no experimental law is better established.

It seems somewhat strange that "Nauticus" does not observe that the experimental fact which he adduces, viz., that when a plane is pulled through water by a force, a fourfold force produces only a double velocity, is in exact accordance with the law that resistance varies as the square of the velocity, and no other. His inference that "the resistance to the immersed plane moving at a double velocity with a fourfold weight is equivalent to the resistance of twofold amount of inertia" (in the water) is right enough; but he forgets that this twofold amount of inertia is moving relatively to the plane with a double velocity.

Hence the proper interpretation of his case is this:—Let w be the weight of the water in motion relative to the plane of velocity v, then $2\,w$ is the weight of water with a relative velocity $2\,v$. Also

$$\frac{w}{g}v$$

is the momentum generated in the first case;

$$2\frac{w}{g}\times 2\,v, \text{ or } \frac{w}{g}4\,v,$$

is the momentum generated in the second case; and as the resistance varies as the momenta generated in equal times, the resistances in the two cases are as

$$\frac{w}{g}v : \frac{w}{g}4\,v \text{ or } \frac{w}{g}\;v^2 : \frac{w}{g}(2\,v)^2,$$

or as the squares of the velocities.

Water is, except under very high pressures, an inelastic or incompressible fluid. Hence all the calculations based on the supposition of its density varying (sensibly) with different velocities, are entirely erroneous, even if the principle of the calculations here made were admissible, which it is not.

We must here take leave of "Nauticus" and his well-meant, though abortive attempt to improve the received law of fluid resistance. Our readers will have no difficulty in perceiving that the view of this subject taken by engineers, which they have in fact borrowed from mathematical philosophers, is in strict accordance with that of Newton, who was indeed the first to discover the law which is now disputed. We will only further observe, that there is no analogy whatever between the resistance opposed by friction to the motion of a train on a railway and the resistance of water to a vessel passing through it. In the former case it is an experimental fact that the amount of friction *is independent* of the velocity; hence it of course follows that (neg-

lecting resistance of the air) to obtain double speed on a railway we need only double the power; but in the other case, from the nature of a fluid, the resistance not only changes with the velocity, but, as we have seen, varies as the square of the velocity; whence it as readily follows, that to double the speed of a vessel moving through water we must quadruple the power.—Eds. M. M.]

THE IRON TRADE.

(*From our Correspondent in Wolverhampton.*)

The Leading Features of the Month—Smallness of Orders—Impetus by the "Fall" Trade—Continental and Home Markets—Relative Demand for 1856 *and* 1857—*Effect of the Indian Mutinies—Contest between Pig Makers and Pig Consumers—Prospects of the Trade — Tendency of Prices.*

The past month has been a period of marked quietude in the proceedings of the iron trade. Orders have been to very small amounts; and most works have been employed upon contracts entered into, before last quarter day. In the majority of instances these will soon be worked out; and there does not seem any good prospect of another supply of the same value.

The slackness in the demand from the United States has largely tended to produce this state of things. Up to the last week, this slackness has been of a character to prevent the sending of scarcely an order from the United States market. During the last week or ten days, however, there has come over a demand for the "fall" trade, which has given a decided impetus to the trade, and for a week or two will keep the houses which are in favour in the American market very busy upon specifications received from across the Atlantic. Some such houses, we know, are unable to do, in the prescribed time, all that their American customers ask them. During all the month, however, one branch of the trade, that engaged in the manufacture of steel iron and steel springs has been exceedingly busy upon orders both from the American and also the home markets. The reduction in the American tariff has not, it will be thus seen, been productive of an increased demand upon the market of the mother country.

At the commencement of the month there was considerable activity in certain quarters in the executing of orders for export *viâ* Hull, viz., the northern ports; but those orders are now nearly all shipped, and there is now no marked inquiry from other continental markets.

From the home market orders continue to run upon sheets and plates, which during the war with Russia were so scarce—showing that English made machinery is very much in request upon the continent—a view which will be further borne out by reference to the Board of Trade Returns for June.

These returns show that whilst upon pig iron, wrought iron, bar and rod iron, and iron wire there was a reduction in June, 1857, of £4,104 upon the export in the corresponding month in 1856 (the figures being for the four descriptions mentioned £1,119,005 for June the last year, and £1,114,901 for June this year), the machinery exported in June, 1857, was of an increased value on June, 1856, of £140,251 upon a very much smaller total (the value in machinery for 1856 being £210,969 against £351,220 in June, 1857). It should be stated here that the decrease in the value of iron exported in June, 1857, as compared with June, 1856, is applicable only to bar and rod iron, and iron wire, there being an increase in regard to pig iron and wrought iron.

The Indian mutinies have not had a more serious effect upon the iron trade, for the most part, than to tighten money, and keep those orders out of the market which are not pressing, or the possessors of which feel disposed to wait and see what influence they will have upon the trade. Orders are being now given for railway iron for the Madras Presidency.

During all the month there has been a contest going on in South Staffordshire with the makers of merchant iron and the pig iron makers—the former refraining from coming into the market with a view to bring down, and the latter nearly as resolutely refusing to sell below their own prices, which, as compared with those of Quarter-day, are 2s. 6d. less per ton. An evidence, however, of the healthiness of the malleable iron trade is shown in the immense "make" of pig iron in South Staffordshire being so far consumed as to leave scarcely any stocks in makers' hands; and the total product is increasing daily.

Statements have reached us lately that some of the "trade" houses have been selling under the scale fixed upon by the members of that coalition at the Quarterly Meetings. If this description of proceeding should be more prevalent at the time of the Preliminary Meeting than it is now, it will have a considerable influence upon the rates that will rule the succeeding quarter. There, however, will not be an alteration upon the rates of the past quarter unless a quiet August should be succeeded by a dull September, which none of us are yet able to determine; but to which evidences at present somewhat tend.

WRIGLEY'S IMPROVED FRICTION COUPLING FOR THE TRANSMISSION OF MOTIVE POWER.

Mr. Francis Wrigley, of Long Island Iron Works, Carlisle, has patented a highly ingenious arrangement of machinery to be applied, either internally or externally, to a frictional surface on a wheel or disc in motion, by which means it is brought gradually into contact within another and similar surface at rest, and thus held without any other retaining force, and thereby made capable of transmitting any amount of power from the prime mover to any shafting, gearing, or other machinery requiring to be alternately set in motion or remain at rest. This is accomplished without shock or concussion to any part of the said shafting, gearing, or other machinery.

The accompanying engraving is a sectional view, taken through the centre of the coupling, showing the arrangement of rods, links, lever and sliding box; *a*, is the shaft, upon which (when at rest) revolves the bevil wheel, *b*, or other driving wheel or drum, and attached to which is the metallic rim, *c*; *d*, *d*, are slots in the flanges of the frictional surface plates, *e*, *e*, and which surface plates are brought into contact with the rim, *c*, by the rods, *f*, *f*, shown partly in dotted lines, actuated by the lever, *g*, through the connecting link, *h*, also partly shown in dotted lines, and the grooved boss, *i*, which slides on feathers sunk on the shaft, *a*.

Supposing the driving wheel to be at rest, and it is required to impart an intermittent motion thereto, that is, to stop or start the said wheel at intervals; the wheel is not secured upon the shaft, but fits loosely thereupon, the apparatus for coupling the wheel with the driving power being firmly secured upon and revolving with the said driving shaft. The lever *g* is moved forward, either by screw power or otherwise, which causes the boss, *i*, to slide along the shaft, *a*, and by means of the links, *h*, to press the ends of the links, *f*, *f*, nearest the centre or shaft, into a line, or nearly so, with their extreme centres; this has the effect of extending the revolving frictional surfaces, *e*, *e*, and thus bringing these surfaces into contact with the rim, *c*, and imparting motion thereto by the friction created between the said surfaces and the rim, and consequently to the wheel desired to be driven. It will be evident that the wheel may be disconnected from the driving power by reversing this action and withdrawing the fractional surfaces from the rim.

The Royal Railway at Gosport.—A new iron and stone bridge for her Majesty's private railway has lately been thrown across the moats of Gosport lines to take the place of the old wooden bridge, which was latterly in a most unsatisfactory condition.

LORD CARLINGFORD'S ANTI-FRICTION SHAFT.

Lord Carlingford has requested us to publish the annexed engraving of the shaft he intends using with his aërial chariot. It will also be found useful in all cases where shafts rotate against a fixed joint. The axis of the shaft, *a*, passes through the boss, *b*, and in order to lessen the friction by the shoulder, *c*, revolving against a similar surface in the boss, two friction wheels, *d d*, are fitted in the bottom of the boss, and bear against the shoulder, *c*. These wheels should be made to converge at bottom, so as to revolve as near the central line of the shaft as may be.

Bronze Powder.—Experiments have been instituted by Herr König, in order to ascertain the method of preparing bronze powder, hitherto a secret. From the result it appears that the several varieties of bronze powdered leaf are each composed of nearly the same proportions of copper, zinc, and tin, and that the variation of colour is owing to different degrees of oxidation, which have been produced by heating the alloy at different temperatures.—*Builder.*

THE ATLANTIC TELEGRAPH.

The following is the substance of a Report made by Mr. C. T. Bright, the engineer of the Company, to the Directors:—

After leaving Valentia on the evening of the 7th inst., the paying out of the cable from the *Niagara* progressed most satisfactorily until immediately before the mishap. At the junction between the shore and the smaller cable, about eight miles from the starting point, it was necessary to stop to renew the splice; this was successfully effected, and the end of the heavier cable lowered by a hawser until it reached the bottom, buoys being attached at a short distance apart to mark the place of union. Up to 4 P.M. on the 8th the egress of the cable had been sufficiently retarded by the power necessary to keep the machinery in motion at a rate a little faster than the speed of the ship; but, as the water deepened, it was necessary to place some further restraint upon it by applying pressure to the friction drums in connection with the paying-out sheaves, and this was gradually and cautiously increased from time to time as the speed of the cable, compared with that of the vessel and the depth of the soundings showed to be requisite. At 4 o'clock in the morning of the 10th the depth of water began to increase rapidly from 550 fathoms to 1,750 in a distance of eight miles. Up to this time 7 cwt. strain sufficed to keep the rate of the cable near enough to that of the ship; but as the water deepened the proportionate speed of the cable advanced, and it was necessary to augment the pressure by degrees until in the depth of 1,700 fathoms the indicator showed a strain of 15 cwt., while the cable and ship were running 5½ and 5 knots respectively.

At noon on the 10th we experienced an increasing swell, followed later in the day by a strong breeze. From this period, having reached 2,000 fathoms water, it was necessary to increase the strain to a ton, by which the rate of the cable was maintained in due proportion to that of the ship. At 6 in the evening some difficulty arose through the cable getting out of the sheaves of the paying-out machine, owing to the tar and pitch hardening in the grooves, and a splice of large dimensions passing over them. This was rectified by fixing additional guards and softening the tar with oil. It was necessary to bring up the ship, holding the cable by stoppers until it was again properly disposed around the pulleys. Some importance is due to this event, as showing that it is possible to lie to in deep water without continuing to pay out the cable—a point upon which doubts have been frequently expressed. Shortly after this the speed of the cable gained considerably upon that of the ship,

and up to 9 o'clock, while the rate of the latter was about 3 knots by the log, the cable was running out from 5½ to 5¾ knots per hour. The strain was then raised to 25 cwt.; but, the wind and sea increasing, and a current at the same time carrying the cable at an angle from the direct line of the ship's course, it was not found sufficient to check the cable, which was at midnight making 2½ knots above the speed of the ship, and sometimes imperilling the safe uncoiling in the hold. The retarding force was therefore increased at 2 o'clock to an amount equivalent to 30 cwt., and then again, in consequence of the speed continuing to be more than it would have been prudent to permit, to 35 cwt. By this the rate of the cable was brought to a little short of 5 knots, at which it continued steadily until 3·45, when it parted, the length paid out at that time being 335 miles. I had up to this time attended personally to the regulation of the breakers, but, finding that all was going on well, and that it being necessary that I should be temporarily away from the machine to ascertain the rate of the ship, and to see how the cable was coming out of the hold, and also to visit the electrician, the machine was for the moment left in charge of a mechanic who had been engaged from the first in its construction and fitting, and was acquainted with its operation. I was proceeding to the fore part of the ship when I heard the machine stop; I immediately called out to ease the break and reverse the engine of the ship; but when I reached the spot the cable was broken. On examining the machine, which was otherwise in perfect order, I found that the breaks had not been released, and to this or to the handwheel of the break being turned the wrong way may be attributed the stoppage, and the consequent fracture of the cable. When the rate of the wheels grew slower as the ship dropped her stern in the swell, the break should have been eased; this had been done regularly before whenever an unusually sudden descent of the ship temporarily withdrew the pressure from the cable in the sea. But, owing to our entering the deep water the previous morning, and having all hands ready for any emergency that might occur there, the chief part of my staff had been compelled to give in at night through sheer exhaustion, and hence, being shorthanded, I was obliged for the time to leave the machine without, as it proves, sufficient intelligence to control it. I perceive that on the next occasion it will be needful, from the wearing and anxious nature of the work, to have three separate relays of staff, and to employ, for attention to the breaks, a higher degree of mechanical skill. The origin of the accident was, no doubt, the amount of retarding strain put upon the cable; but had the machine been properly manipulated at the time, it could not possibly have taken place. It has been suggested that the machinery is too massive and ponderous. My experience of its action teaches otherwise; for three days in shallow and deep water, as well as in rapid transition from one to the other, nothing could be more perfect than its working; and since it performed its duty so smoothly and efficiently in the smaller depths, where the weight of the cable had less ability to overcome its friction and resistance, it can scarcely be said to be too heavy for deep water, where it was necessary for the increased weight of cable to restrain its rapid motion by applying to it a considerable degree of additional friction. Its action was most complete, and all parts worked well together. I see how it can be improved by a modification in the form of sheave, by an addition to the arrangement for adjusting the breaks and some other slight alterations; but with proper management, without any change whatever, I am confident that the whole length of cable might have been safely laid by it; and it must be remembered, as a test of the work which it has done, that, unfortunate as this termination to the expedition is, the longest length of cable ever laid has been paid out by it, and that in the deepest water yet passed over. After the accident had occurred soundings were taken by Lieutenant Dayman, and the depth found to be 2,000 fathoms. It will be remembered that some importance was attached to the cables in the *Niagara* and *Agamemnon* being manufactured in opposite lays. I thought this a favourable opportunity to show that, practically, the difference was not of consequence in effecting the junction in mid-ocean. We therefore made a splice between the two vessels, and several miles were then paid out without difficulty. I do not perceive in our present position any reason for discouragement, but I have, on the contrary, a greater confidence than ever in the undertaking. It has been proved beyond a doubt that no obstacle exists to prevent our ultimate success. The structure of the cable had answered every expectation that I had formed of it, and if it were now necessary to construct another line, I should not recommend any alteration from the present cable, which in its working has confirmed my belief that it is expressly adapted to our requirements.

A very full meeting of the directors of the Atlantic Telegraph Company was held at their offices on Wednesday, the 19th.

The fullest investigation into the events which have led to the present pause in the undertaking, into the sufficiency of the appliances for paying out the cable, and into

the additional arrangements and precautions which the valuable knowledge and experience gained by the late attempt will dictate in respect to future operations, has been committed to the charge of sub-committees appointed for the purpose to report to the General Board. The directors sit in permanence until their future plans have been fully discussed and determined on.

ASTRONOMICAL OBSERVATIONS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Your astronomical readers know that the correct instant of a celestial observation to the smallest fraction of a second is a matter of the greatest importance. I have a scheme by which this could be accomplished to the $\frac{1}{100}$ part of a second, provided I could graduate the arc through which a pendulum vibrates, so as to show the arcs passed through in equal times. These arcs, it is manifest, cannot be equal, the arcs at the lowest point being greater than those which are more remote. But in what ratio, or by how much they increase, from the point of the pendulum's greatest elongation to its lowest positon, I am unable to determine. If any of your mathematical correspondents could give my required graduation to the $\frac{1}{100}$ part of a second they would greatly oblige Your constant reader,

Mechanicus.

St. Andrew's, Scotland.

SOUND-SIGNAL FOR SHIPS AT SEA.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Those means which at present are generally resorted to on board of ships when they sail in crowded passages and during night-time and foggy weather, and which means principally consist in making all sorts of noises, blowing horns, beating the anchors, &c., do not at all appear to answer the purpose; the crew of each respective ship being prevented by their own noise from hearing any sounds of another approaching vessel; and I was induced to suggest a contrivance, at once cheap, and in all probability answering the purpose far better than any that was employed hitherto for that purpose, of the nature of which the following short sketch will convey an idea.

A bell of sufficiently strong sound and proper pitch ought to be on board of every vessel; as, however, a bell of a very strong sound, such as could be heard a considerable distance off, would require to be of a sufficiently large size, and would not only be expensive, but would certainly be inconvenient to carry on board ship, I devised the following plan, by which the sound, even of a common ship's bell (of course not too small a one) would be propagated to a considerable distance ahead.

A funnel-shaped tube, of sufficient size and convenient shape, is fixed on a convenient part of the bows of a vessel, with its wide and open part directed straight ahead, and with the bell suspended in its narrow part, which is closed behind; and this bell is set a-ringing in any suitable manner, whenever such is required. It will be perceived that this, as I might call it, "sound-propagator or condenser" would naturally condense, and throw to a considerable distance in one direction, the sound of that bell, in a similar manner as a suitable speaking trumpet does condense and propagate the sound of the human voice; the only difference between the two being in the application and size, and in the circumstance that, in my "sound-propagator," the sound-producing agent is *within*, instead of, as is the case in a speaking-trumpet, behind the apparatus; and the back portion of my apparatus is hence to be made of such a shape, that the latter circumstance would not in the least tend to neutralize any rays of the sound of that bell.

The advantages to be gained by such a simple and cheap apparatus being furnished to every ship would evidently be very considerable, as there can hardly be a doubt that a vast number of such accidents, which now are of almost daily occurrence, would be altogether prevented, and a great amount of property and life thus saved; for this apparatus would cause the sound of our own bell to be heard distinctly at a great distance ahead, and we should, at the same time, hear *less* of the sound of our own bell, and hence would be more able to hear the sounds of vessels which are approaching towards us.

I submitted the suggestion to the Admiralty; and being of opinion that it is practical, and its realization productive of great benefit, I am anxious that it should become known as generally as possible, as thus it might come to the notice of such as have the means and will to make a practical trial. Should it prove practical and useful, then I trust that it will not be seized upon and monopolized by others; I myself would not patent the same, as I should never patent and thus monopolise an invention which *directly* tends to prevent disasters and losses to my fellow men. Should it, however, be *impractical*, then I should be very much obliged to any of your readers who would point out, and clearly and distinctly state the reason *why*, for I am of a nature which causes me to be pleased rather than otherwise, whenever I am cured of a *delusion*.

I am, Gentlemen, yours, &c.,

G. J. Gunther.

5, De Beauvoir Villa, Mortimer-road,
Kingsland, N.E.

THE LATE BRIGHTON RAILWAY ACCIDENT.

On the first report of an accident on a railway, the poor directors and head officers are taunted with mismanagement, carelessness, and a multitude of other sins. In many cases, these charges are not erroneously brought forward; but in the late accident on the Brighton line, the directors and chief officers are blameless, and the unfortunate occurrence is only to be attributed to the engine-driver, and to the person whose duty it was to have coupled the signal line from guard to driver, and to have seen that that line was in proper working order. It is admitted that the danger signal was on, but from inattention it was unnoticed or disregarded by the driver; it appears also that all the Brighton trains are provided with a cord or rope running under every carriage, furnished with a snap swivel joint at each end; the swivels are connected when the train is made up, and thus a continuous connection is effected from one end of the train to the other. One end of this line of communication is attached to a bell on the engine, and the other enters the guard's van.

This is an admirable contrivance, and if maintained in efficient working order should be adopted on every line of railway. As the guard of the train to which the accident occurred was on the alert, and did notice the danger signal, it is to be assumed the accident would have been prevented, notwithstanding the driver's neglect, had the signal cord been in good working order. Whose duty was it to attend to the proper connecting and working of this cord? And why was it neglected? If entrusted to a porter at 18s. a week wages, we urge upon the directors at once to appoint a well-paid and responsible man at every station where trains are made up to attend especially to these signal cords. And in order to avoid accident from the engine driver not observing, or, observing, failing to pay attention to the danger signal, would it not be practicable to cause the turning of the danger signal to throw up an inclined plane by the side of the rails, and act upon a rod depending from the engine, connected to the steam valve, and shut-off steam from the cylinders?

This or some other similarly-acting apparatus might be tried at little expense, and any plan which would stop the engine, with or without the aid of the driver, upon the exhibition of the danger signal, would go far to prevent those accidents which occur from trains running into other carriages.

MISCELLANEOUS INTELLIGENCE.

The Electric Telegraph.—A new electric telegraph has been erected to connect the establishments of Messrs. Waterlow and Sons, Birchin-lane and London-wall. This is the first instance, it is believed, of a telegraph being carried over houses in any large town in England, and also the first instance of a private firm having called to its aid this important and useful invention. The distance between the two establishments is about one-third of a mile, and the whole space is traversed by a single wire, suspended from pole to pole, at a great elevation above the intermediate houses; indeed, so much so, as to be scarcely perceptible to the eye. It is understood that Messrs. Waterlow and Sons have been prompted to erect this telegraph, not only to assist in their business transactions, but from a desire to give a practical illustration to a scheme which Mr. S. H. Waterlow submitted some time since to the police authorities for uniting the police-courts, the police-stations, and the fire-brigade stations throughout the metropolis, by an economical system of overhead telegraph, devoting one wire to detective police purposes, and one to fire purposes; the argument being that the cost of erection (which, by this plan, is exceedingly small, say 30*l.* for each station, including bell and single needle instrument) would be met by the saving of property at any one large fire. This telegraph was erected under the entire superintendence of Mr. Owen Rowland, Telegraph Engineer, Old Broad-street, E. C., London, who was principal assistant to Mr. Cooke when the first telegraph was erected on the South Western Railway, in 1845.—*Morning Herald.*

Monster Mortars.—One of the monster mortars manufactured by Messrs. Mollet, of Blackwall, and designed, under the special direction of Lord Palmerston, to carry the 36-inch shell, was recently forwarded to the Arsenal wharf, Woolwich. This experimental piece of ordnance is manufactured of wrought iron in five distinct segments, for the facility of transport, the entire piece amounting to the weight of 41¾ tons, each compartment weighing from 1 to 20 tons, and the bed alone, composed of solid oak work, weighing 10 tons. Each alternate division contains a pipe and socket, which, when fitted, will be overlaid with a grooved hoop or ring of considerable substance, and secured by singularly contrived fixed staples and keys, so as to form one solid whole, and said to be capable of sustaining an equal amount of resistance with any piece of ordnance hitherto invented. The preparations for the proofs are completed, and will shortly take place in Wool-

wich Marsh. There is a second mortar of similar calibre, but of much heavier metal, from the same manufactory.

Spontaneous Combustion of Trees.—A singular occurrence is stated to have recently taken place at Chesterfield, United States. In a field adjoining a large meadow, smoke was seen issuing from a decayed portion of a beautiful tree, and afterwards flames were observable, which were with great difficulty subdued. In a short time afterwards the body of another tree in the same field was discovered to be on fire, and defied every exertion that was made to save it. The flames encircled the whole body, until the tree broke off about six feet up. The previous condition of either tree is not stated very fully, nor does it appear exactly how efficient was the fire department which made such heroic efforts to save them.—*Scientific American.*

The Island of Cuba.—This island, so favoured by nature as to be designated "The Pearl of the Antilles," is not left behind by some European countries, so far as regards the progress of industry. A company has recently been formed for the purpose of advancing money for the cultivation of the soil, and has a capital of £1,600,000 sterling. An institution of this description has never yet been established in Europe. Six companies are established to work the mines of this fertile soil.

Photographic Paper.—The Industrial Society of Mulhouse has offered a prize of a silver medal for 500 kilogrammes of paper possessing every quality necessary for photographic purposes. The conditions are, that the paper should be made of materials perfectly pure and homogeneous, entirely free from metallic spots, small holes, or marks of any kind; its thickness must be exactly equal throughout, with both sides alike, and it must be capable of being saturated with a liquid by floating for not more than ten or fifteen minutes, without its being necessary to warm the fluid; it must also be able, when in large sheets, to bear the necessary handling after soaking in water for several hours. Among existing papers, Turner's (of England) most nearly fulfils these conditions. The Society of Arts has offered a prize for a similar paper.

Inventors Looking Up.—At the recent Commencement of Union College, Schenectady, N. Y., under the presidency of the venerable Dr. Nott, himself a patentee of several improvements, Hiram Berdan, of this city, the well known inventor, received the degree of Master of Arts. This recognition of men of genius by our colleges will tend to elevate in the social scale a most worthy class of our citizens, hitherto quite neglected, so far as the bestowment of honours are concerned.—*Scientific American.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Newton, A. V. *Improvements in machinery for boring, turning, tapping, and screwing fittings for gas, water, steam, and other pipes, and in vices for holding the same while they are operated upon.* (A communication.) Dated Dec. 15, 1856. (No. 2974.)

This relates to the arrangement and construction of several parts of a machine, and to the combination of two or more of those machines, so as to tap, screw, bore, seam, or turn different ends of pipe fittings at the same time. Also in a compound vice having two or more sets of jaws adapted to holding fittings, and arranged to revolve on a centre common to all the jaws. Engravings are essential to a complete description of this invention.

Austin, W. *Improvements in pipes or tubes, and in the method of joining and laying the same.* Dated Dec. 16, 1856. (No. 2975.)

This consists in making the shape or form of the extremities of each length of pipe alike in lieu of the ordinary flange, so that they will follow each other and form, when laid, a continuous tube by alternately turning them over or reversing them.

Vasserot, C. F. *Preserving salmon, trout, and other fish.* (A communication.) Dated Dec. 16, 1856. (No. 2976.)

The fish is cut in pieces, soaked in water for about 4 hours, the water renewed, the pieces soaked again for 2 hours, then placed in a net and plunged into a bath composed of 3 to 4 pints of water per pound of fish; 1 lb. of salt per 10 pints of water; 1 oz. of pepper per 10 lbs. of fish; 3 ozs. of cloves per 10 lbs. of fish; ½ oz. of laurel per 10 lbs. of ditto; 1 oz. of cinnamon per 10 lbs. of ditto. The fish must be left in the bath from 2 to 4 hours, then taken out and cooled for 24 hours. The skin and bones are next removed, the fish sliced, again dried, and then placed in glass or other non-metallic jars in oil, additional oil being once or twice added to supply the place of that absorbed by the fish, and the jars are finally sealed hermetically.

Heywood, E. *Improvements in machinery or apparatus used in weaving.* Dated Dec. 16, 1856. (No. 2977.)

This relates to means for facilitating the obtaining of variations in the pattern of the fabric during the working of the loom, and consists in forming the cards of the jac-

quard apparatus used to work the heddles with several sets of holes or perforations, each set being capable of acting independently upon the needles or wires of the jacquard apparatus, combined with a capability of shifting the position of the ends of those wires or needles operated upon by such cards that the attendant may vary the pattern by operating upon a lever handle, or other connection, to cause another set of holes in the same cards to operate upon the needle or wires. Also in giving rotary motion to the card cylinder by a portion of a thread or screw acting upon a suitably cut wheel or disc upon the axis of such card cylinder, and of retaining such cylinder from rotation at the time of acting on the needles by a continuous run of such screw wheel till the next partial rotation, when the portion or portions of thread or screw will again operate. Also in connecting the jacquard wires or needles with levers or rods, so as to bring them into or take them out of position. Also to means for giving motion to rotary shuttle boxes, in order that when a change of shuttle is desired any one of the series of shuttle chambers may be brought into a line with the race.

THOMAS, W. F. *Improvements in sewing machines.* Dated Dec. 16, 1856. (No. 2978.)

In order to keep the edges of the materials to be sewn up to the guide, discs or rollers on axes placed in an oblique direction to the movement of the materials are used together with the guide; or in place of such oblique rollers or discs, instruments moving towards the guide may be employed, such instruments having motion communicated to them so as to admit of their passing back from the guide without moving back the materials. When binding the edges of articles by a sewing machine, a rotary brush is employed to keep the binding material in position.

GERHARD, F. W. *Improved means of obtaining aluminium metal, and the adaptation thereof to the manufacture of certain useful articles.* Dated Dec. 16, 1856. (No. 2980.)

To effect the extraction of aluminium from the ore the patentee takes the fluoride of aluminium, and subjects it to the action of hydrogen gas. This reduction of the metal from its fluoride by means of hydrogen gas may be performed in various ways, but the apparatus which he employs consists of a vaulted oven, with the floor thereof composed of iron, under which the fire is placed. This oven is first strongly heated, and on the floor thereof he places a number of porcelain shallow dishes. A number of these said dishes he fills with dry and well-powdered fluoride of aluminium, and the remainder with iron filings. He so arranges them that all of those dishes which contain the fluoride are on all sides surrounded by dishes containing the iron filings. The oven is then closed and luted, and the heat increased to redness, after which he introduces a stream of dry hydrogen gas. The effect produced is, that the hydrogen gas combines with the fluorine, and forms hydro-fluoric acid, which acid is taken up by the iron and is thereby converted into fluoride of iron, whilst the resulting aluminium remains in the metallic state in the bottom of the trays containing the fluoride.

STOBO, J. *Improvements in forcing or lifting corrosive or chemical liquids.* Dated Dec. 16, 1856. (No. 2981.)

This relates to so arranging and working machinery for forcing, lifting, or transmitting chemical liquids, that such liquids may be prevented from coming into direct contact with the working pump surfaces, or such metallic surfaces of the apparatus as are liable to injury from the corrosive action of such chemical liquids.

NEWTON, W. E. *An improved process or processes of treating feldspar so that it may be used as a manure, or for obtaining potash or soda therefrom.* (A communication.) Dated Dec. 16, 1856. (No. 2983.)

The subject of this invention is that either potash or soda can be obtained from feldspar easily and economically for use in the arts, or a valuable manure directly results by the process of heating feldspar together with phosphate of lime and lime.

NEWTON, A. V. *Improvements in printing presses.* (A communication.) Dated Dec. 16, 1856. (No. 2984.)

This relates—1. To the application to the impression cylinders or some other part of Napier printing presses, or to type-revolving presses, of fingers so constructed and operated that the sheet of paper, after being carried through the machine to receive the impress of the first form, will be seized and returned to the types a second time in order to print the other side. By this means the sheet is perfected at a single operation, and without checking the regular and usual motions of the press. 2. To providing an extra or second cylinder which is furnished with fingers for seizing the sheet, and in placing the said extra or second cylinder behind the impression cylinder, so that the sheet will be drawn around a part of the circumference of the second or extra cylinder, and delivered to the impression cylinder to receive a second impression. 3. To the peculiar construction of the fingers for seizing the sheet. The invention cannot be described in detail without engravings.

SMITH, J. *Improvements in machinery for pumping.* Dated Dec. 17, 1856. (No. 2985.)

This consists in the use of cords, chains, &c., for transmitting motion from the steam engine to the pumps employed in mines, &c., instead of employing rigid pump trees and elbow levers as now customary.

PLATT, J. *Improvements in mules for spinning.* (A communication.) Dated Dec. 17, 1856. (No. 2988.)

This refers to mules constructed upon Sharp and Roberts' principle, and to those motions which effect the taking in and backing off. The patentee dispenses with the clutch box, and adapts fast and loose pulleys to the shaft.

NEWTON, W. E. *An improvement in the manufacture of table knives.* (A communication.) Dated Dec. 17, 1856. (No. 2989.)

This consists in uniting the steel blade with the cast shank, whether of cast iron or malleable iron. The union of the parts is effected by cutting a groove in the forward part of the balance nut of the shank, of the required size to receive the rear end of the steel blade. The latter is heated to about a cherry red heat, and borax is applied to the surfaces which are to be united. The nut with the steel blade inserted is then heated to about a cherry red heat, and the welding effected by the application of percussive pressure on the outer surfaces of the nut.

LEVICK, F., jun., and J. JAMES. *Improve- in the mode of utilizing the waste gases of blast furnaces.* Dated Dec. 17, 1856. (No. 2990.)

This consists—1. In applying the gases to the puddling or balling and reheating of iron, and simultaneously with this heating the air to be used in blast furnaces; or, 2. In applying the heat obtained by the construction of such gases to the generation of steam after it has operated upon the molten metal in the puddling hearth.

CARLINGFORD, Viscount. *An aërial chariot or apparatus for navigating the air.* Dated Dec. 17, 1856. (No. 2993.)

This invention was described and discussed in Nos. 1765 and 1766.

RENOU, V. L. C. *An improvement in the manufacture of spirit when rice is used.* Dated Dec. 17, 1856. (No. 2994.)

Here the rice is first boiled in water, to which, when boiling, sulphuric acid is added to convert the rice into saccharine, which is then made into a wash, fermented, and then distilled and rectified as usual.

HOWELL, F. B. *Improvements in machinery for cutting or making corks.* (A communication.) Dated Dec. 18, 1856. (No. 2995.)

This machinery for cutting or making corks consists—1. In the application to machines for cutting or making corks of a feeding apparatus. 2. In mechanism for cutting or making corks of an oval or nearly oval form in the cross section; and, lastly, in a machine for cutting corks into oblong pieces, to be afterwards cut or formed into corks.

CLARK, G. M. *Improvements in the manufacture of moulded candles.* Dated Dec. 18, 1856. (No. 2999.)

This consists in combining machinery and apparatus for filling candle moulds, so that manual labour will be reduced. The frames of moulds will not require troughs, and the moulds should not be completely filled. The moulds are by the machine moved under a series of funnels, the ends of which come just over the openings into the filling ends of the moulds. By means of several cups, the apparatus raises the melted candle stuff, each cup being arranged to contain only so much as will fill or nearly fill a mould, and these cups are caused by the machine to empty themselves into the funnels over the moulds.

BOWER, J. *An improvement in treating animal matters in preparing them to be used for the manufacture of manure.* Dated Dec. 18, 1856. (No. 3000.)

This relates to refuse animal matters, such as old leather, skins, hair, wool, &c. These are placed in a vessel in connection with a cistern containing dilute acid. A high pressure steam boiler is combined with the vessel by means of a steam pipe with a valve or cock therein; such steam pipe descends to near the bottom of the vessel containing the animal matters, which are dissolved by the steam admitted from the boiler, and converted into a product to be combined with dry materials for making up manures.

FAY, C. *Improvements in railway carriages and breaks.* Dated Dec. 18, 1856. (No. 3002.)

These relate—1. To an arrangement of mechanism for actuating the breaks of railway carriages, whereby the whole of the carriage wheels may be simultaneously breaked. 2. To modes of attaching the bearing springs and axle-boxes of railway carriages so as to allow for the free play of the axles in passing over curves.

BROWN, J. *Improvements in the construction of ships' yards.* Dated Dec. 18, 1856. (No. 3003.)

The patentee takes a wooden spar of about three-fourth parts of the length of the yard, and the other fourth part he forms of two wrought-iron tubes fixed on each end of the spar for about two feet, the ends of the spar abutting against cross pieces of metal fixed inside the said tubes.

DONNY, F. *Improvements in the manu-*

facture of lamps. Dated Dec. 18, 1856. (No. 3004.)

This lamp fulfils two conditions—1. It allows of the consumption of heavy coal tar oil without producing smoke. 2. The functions of this lamp are not influenced by the impurities which may be produced by the oil in burning; also the flame produces a regular light, that is to say, after ten or twelve hours' combustion the light will have lost none of its intensity, and during all that time the lamp will not require any cleaning.

SIMONDS, W. A. *An improved life-preserving float.* Dated Dec. 18, 1856. (No. 3005.)

Two thicknesses of India-rubber cloth are attached together by seams, leaving spaces between them. These are filled with ground cork, and the ends being closed, strips are formed across their ends, the sides being closed up. These strips are attached to corresponding strips on the lower halves.

PENNY, J., and J. BOOTH. *Improved machinery for washing, cleansing, and drying grain.* Dated Dec. 19, 1856. (No. 3010.)

This has reference to that portion of the apparatus to be employed in washing grain, of an iron cylinder upon the inside of which is fixed a number of iron spikes, against which the grain to be washed is worked by revolving brushes suitably placed in the said cylinder, which is filled with water. After the grain has been cleansed, it is discharged into a sifter at another part of the machine, to which motion is imparted; from thence it passes into another part of the machine, where it is dried by imparting a high speed to the vessel. An important feature consists in performing all the operations simultaneously, and in the same machine.

MURDOCH, J. *An improved ships' main pump, applicable to other purposes also.* Dated Dec. 19, 1856. (No. 3011.)

The barrels and chambers of this pump are cast in one piece, and instead of having one barrel working with one suction pipe and one discharge pipe, and one receiving chamber and one discharging chamber, the patentee has two or more barrels working with one suction and discharge pipe, and one receiving and discharging chamber. By substituting two or more barrels he obtains a continuous flow through the suction and discharge pipes.

WHITE, T. *A new or improved manufacture of boots, shoes, and other coverings for the feet.* Dated Dec. 20, 1856. (No. 3015.)

This invention cannot be described without engravings.

HARRISSON, G. A. *Improvements in breech-loading fire-arms.* Dated Dec. 20, 1856. (No. 3016.)

This invention was described and illustrated at p. 78 of No. 1772.

LOOS, E. *Improvements in the manufacture of cement, mortar, concrete, and artificial stone.* Dated Dec. 20, 1856. (No. 3017.)

The patentee manufactures Roman mortar with a certain proportion of lime, and a chemically calculated quantity of fine sand, and powdered substances of a siliceous, argillaceous, aluminous, alkaline, coagulative, and colouring nature, as well as natural and artificial sulphates and carbonates.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

WICKENS, H. *A throat guard or apparatus for protecting the throat against garotting or other external violence.* Dated Dec. 13, 1856. (No. 2966.)

This consists in placing between linen, &c., a series of strips of wood or metal. These strips are of such a length that one end will rest upon the breast while the other comes above the chin in front and lower jaw-bone at the sides. For ease in wear the strips are gradually reduced in length as they approach the two ends of the apertures, which, when worn, will come at the back of the neck.

WADSWORTH, J. *Certain improvements in heating and ventilating apartments, buildings, and ships, and in apparatus applicable to and to be used for such purposes.* Dated Dec. 13, 1856. (No. 2967.)

An external air chamber having its outlet opening into the apartment to be heated, envelopes an inner chamber or tubes in which the gas or other heat-producing combustible is to be burnt. The temperature of the air passing into the room is raised during its circulation through this outer air chamber by contact with the heated surface or surfaces of the inner chamber or tubes.

GRANT, J. *Improvements in heating or cooking by gas, and in apparatus for effecting the same.* Dated Dec. 15, 1856. (No. 2970.)

This consists in heating or cooking by gas, so that the matters cooked or heated are not exposed to the products from the combustion thereof. It further consists in a means of ventilating the oven or chamber heated by the introduction at the lower part thereof of heated air, and by providing outlets at the top of the oven.

MILLNER, J. *Improvements in chimney cans or caps.* Dated Dec. 15, 1856. (No. 2971.)

The openings for the escape of the smoke from the improved cap are in their combined area equal to the area of the chim-

ney of an angular form, and disposed at the corners of the cap. They are of the greatest width at the upper part, and taper down to a point. A cover is placed horizontally on the top, of an area equal to more than double that of the chimney cap or can, which it protects effectually from wind striking down.

JACKSON, L. D. *A pneumatic break or apparatus to be attached to railway carriages or trucks for the purpose of retarding or stopping the same.* Dated Dec. 15, 1856. (No. 2972.)

This break is intended to be attached to each carriage by means of a connection from one end of the train to the other. A traversing plummer block is fixed at each end of the carriage to allow for oscillation. A small plummer block is attached near to the centre of the carriage or truck, and underneath the same, to form a bearing, and near to this bearing to have on the shaft either a screw, eccentric, or cam, for putting the break in or out of gear, so as to place the same under the control of either the engine driver, stoker, or guard.

CORATS, A. F. DES. *Certain improvements in lamps.* Dated Dec. 15, 1856. (No. 2973.)

This consists — 1. In constructing the wick apparatus so as to dispense with the adjusting key used in ordinary moderator lamps. 2. In the means of raising the cover of the reservoir in order to pour the oil in and raise the piston. 3. In the method of raising the wick. 4. In conducting oil to and removing the surplus oil from the wick. These several features cannot be described without engravings.

CARWOOD, W. *An improvement in steam engines.* Dated Dec. 16, 1856. (No. 2979.)

The cylinder of the improved engine moves to and fro over a fixed piston and hollow piston rod. The steam is introduced into the hollow fixed piston rod, through passages in which the steam passes into and from the two ends of the cylinder. A suitable slide valve (actuated by an eccentric and valve rod) is employed within the hollow fixed piston rod, by which the induction and eduction of the steam is regulated. The steam cylinder in its movement gives motion to a crank shaft.

GOSSAGE, W. *Improvements in the manufacture of sulphuric acid, and in the construction of apparatus used for such manufacture.* Dated Dec. 16, 1856. (No. 2982.)

The inventor has discovered that much advantage arises in the manufacture of sulphuric acid when the height of the chambers employed is greatly increased, and the proportionate horizontal area diminished; also, when the gases employed are caused to pass through the chambers vertically.

FONTAINEMOREAU, P. A. L. DE. *Improvements in obtaining motive power.* (A communication.) Dated Dec. 17, 1856. (No. 2986.)

This consists in the construction of an apparatus with treddles which, when actuated by the feet of one man, put in motion a fly wheel and pulley.

THWAITES, J. H. B. *A new or improved machine or apparatus for holding postage or receipt stamps, and applicable wholly or in part to other similar purposes.* Dated Dec. 17, 1856. (No. 2991.)

This consists in a box for containing the stamps, which may be either wound round an axis contained within the box or may be folded, for which purpose they form a continuous ribbon. In the face or on the top of the box is a slit, through which projects one end of the ribbon of stamps, and level with the slit is a small table, against the edge of which the stamps drawn out from the reservoir may be torn off as required.

COWPER, C. *Certain improvements in electro-plating.* (A communication.) Dated Dec. 17, 1856. (No. 2992.)

Here four ounces of cyanide of copper and ten ounces of cyanide of potassium are dissolved in a pint of hot water. The solution is filtered, and mixed with twenty pints of water, and heated for an hour. A solution of silver is precipitated by a compound of cyanogen, so as to obtain cyanide of silver, which is well washed. Two ounces of the cyanide of silver and ten ounces of the cyanide of potassium are dissolved in a pint of water, and the solution is filtered, and added to the solution containing the cyanide of copper. The mixed solution is again heated, and kept hot for an hour, and this forms the silvering bath] for electro-plating. A galvanic battery of zinc and carbon may be employed.

ELCE, J., and S. HARTLEY. *Improvements in machinery for moulding.* Dated Dec. 18, 1856. (No. 2996.)

This consists in the use of cams on eccentrics connected together and acting simultaneously on the upper box, whereby it is gradually raised until the mould is free from the pattern, and the steadying pins from the holes in which they fit.

HARTLEY, W. *Improvements in spinning frames for spinning wool, hair, alpaca, cotton, silk, flax, or any other fibrous substances on spools, paper tubes, or any kind of bobbins.* Dated Dec. 18, 1856. (No. 2997.)

This consists of a regulator or sliding plate attached to the lifter or travis rod by which the inventor can put any given length on his spools, paper, tubes, or bobbins. A spring is also attached to prevent the spools, &c., from running over by stopping the frame at the given length.

DRAPER, J. *Improvements in apparatus for grating and crushing salt and sugar.* Dated Dec. 18, 1856. (No. 2998.)

A box is constructed with one end formed into a hopper, into which is to be placed the salt or sugar. At the lower part of the hopper is applied a rotating grater mounted on necks or axes, and receives motion by means of a crank handle exterior of the box. Below the grater is a pair of crushing rollers, which are caused to revolve by gearing in connection with the axis of the grater.

WIGRAM, W. K. *An apparatus for igniting lucifer matches, or matches tipped with phosphorus or igniting composition.* Dated Dec. 18, 1856. (No. 3001.)

This consists of a holder for the match, and of a cylinder with a rough surface, both placed vertically and on axis. The holder is caused to turn and present the prepared end of the match to the roughened cylinder, which is also rotated, and which, when about being returned by a spring to its original position, rubs against the end of the match and causes it to ignite.

BEAVER, L. *Improvements in machinery for propelling vessels.* Dated Dec. 19, 1856. (No. 3006.)

This consists in the application of vanes to which a to-and-fro motion is given by steam or other power. These vanes have an oscillating motion on their axes, by means of which they are turned one-fourth round at every stroke for the purpose of bringing the vane or propeller in a line with the direction of motion of the vessel at the back stroke, and at right angles thereto at the advancing stroke. These vanes or propellers are made to work in tubes or not.

RYE, W. and J. SIMPSON. *An improved self-acting willow for opening cotton and other fibrous materials.* Dated Dec. 19, 1856. (No. 3007.)

This consists in rendering the willow self-acting by means of machinery by which the feed and the delivery of the material are effected alternately. The feeding apron is set in motion for a short time to deliver the material to the drum, and is then stopped while the material is operated upon; a sliding door is then opened to allow the material to be discharged, and is closed while a fresh portion of the material is admitted.

GREG, R. H., and H. R., and J. HOPE. *Certain improvements in machinery or apparatus for polishing or finishing yarns or threads.* Dated Dec. 19, 1856. (No. 3008.)

This applies to finishing the threads in the hank or skein, and consists in the use of a comb with teeth at right angles to it, or complex or circular as a spiked roller, and which may be stationary or revolving.

MASSI, C. *Improvements in apparatus for mounting cameras.* Dated Dec. 19, 1856. (No. 3009.)

Two cameras are used to take two pictures at the same time, and at an angle to each other for stereoscopic purposes, the two cameras are placed in a stand through which are two parallel slits or openings for the passage of two pairs of studs, which are fixed to two bars, one pair to each bar. The two studs of each bar are at a distance apart, so as to pass through the two parallel slits in the surface above. The two cameras are each placed on to the two stems of one of the bars, by which means, so long as the two bars are parallel to each other, the cameras will be parallel.

MOORHOUSE, H. *Improvements in self-acting signals for railways.* Dated Dec. 20, 1856. (No. 3012.)

To work the ordinary stationary lamp signals the inventor fixes near the bottom of the signal post a disc turning on its centre, with a few teeth on that part of its periphery, near the post, the said teeth working into a bevel wheel at the bottom end of a vertical rod in communication with the signal lamps. To the disc he fixes an arm projecting towards the rails, so that on the arrival of a train the front of the engine will push the said projection aside and turn the table; this acting on the bevel wheel aforesaid, will turn the vertical rod, thereby showing the required signal lamp, or changing them without the interference of any person. There are other arrangements in connection with this invention.

BATCHELOR, H. *Certain improvements in steam boilers.* Dated Dec. 20, 1856. (No. 3013.)

This relates to the construction of vertical steam boilers, and consists of a novel arrangement effected by fitting together a series of cylindrical tubes of large diameter, one within the other, and connected together alternately at top and bottom, so that annular water spaces and flue spaces are formed, and a series of large, plain and uniform heating surfaces are exposed to the direct or secondary action of the fire.

EDRIDGE, J. *Improvements in the manufacture of hair pins, shawl and other dress pins, parts of which improvements are also applicable to the manufacture of clasps and similar dress fastenings.* Dated Dec. 20, 1856. (No. 3014.)

This consists in corrugating or otherwise bending such pins, either throughout the entire length, or at one or both points, so as to cause such pins to take a firmer hold in the hair.

PROVISIONAL PROTECTIONS.

Dated May 29, 1857.

1522. Peter Armand Lecomte de Fontainemoreau, of London. Improvements in the construction of smoke-consuming furnaces, applicable to boilers. A communication.

Dated June 10, 1857.

1622. Frederic Koehler, of Finsbury-place. Improvements in gunpowder.

Dated June 16, 1857.

1676. Charles Bernard Ochin, of Paris, merchant. Improved metallic roofing slates.

Dated June 23, 1857.

1748. William Symons, of Dunster, Somerset, chemist. Improved means of communication between the passengers and guards of railway trains.

Dated July 14, 1857.

1954. Henry Hebblethwaite and William Shuttleworth, carpet manufacturers, and William Tasker, mechanist, all of Halifax, York. Improvements in preparing yarns for, and in machinery or apparatus employed in printing yarns for, carpets or other similar fabrics.

Dated July 15, 1857.

1970. Henry Blandford, of Sandridge Bromham, Wilts, farmer. An improved combination of apparatus for distributing manure.

Dated July 16, 1857.

1972. Wright Jones, of Pendleton, iron founder. Improvements in moulding for casting metals.

1976. Guillaume Defis, of Marseilles. Certain improvements in preventing incrustation in boilers.

Dated July 18, 1857.

1991. William Cliff, of St. Martin's-le-Grand. A new system of applying the air from the bellows and other means to the forge. A communication.

Dated July 22, 1857.

2014. William George Armstrong, of Newcastle-upon-Tyne, civil engineer. Improvements in the mode of adjusting ordnance for fire by night or day.

Dated July 29, 1857.

2064. Charles William Siemens, of John-street, Adelphi. Improvements in refrigerating and producing ice, and in apparatus or machinery for that purpose.

2066. Hartley Kenyon, of Manchester, manufacturing chemist. Improvements in the treatment of certain compounds of silica, alumina, sodium, or potash, and the application of such compounds in the processes of printing, dyeing, tawing, paper making, or in any other process in which the alumina of commerce is employed.

2068. William Edward Jones, of Birmingham, engineer. Improvements in the manufacture of iron plates, such as boiler plates, plates for ship building, and other similar purposes, and also in machinery for the manufacture of such plates.

2070. George Hallen Cottam and Henry Richard Cottam, of the St. Pancras Iron Works, Old St. Pancras-road. Improvements in the manufacture of children's cots and metallic bedsteads.

Dated July 30, 1857.

2072. William Stettinius Clark, of High Holborn. Improvements in kegs for holding gunpowder, and articles of a similar nature. A communication from W. Green and W. Delaware, of America.

2074. Samuel Coulson, of Sheffield. Improvements in preparing solutions for coating with aluminium.

2076. Thomas Ivory, of Edinburgh, advocate. Improvements in rotary and reciprocating engines.

2078. Henry Bauerrichter and Gustavus Gottgetreu, of Charterhouse-square, manufacturers. Improvements in the arrangement or adaptation of stereoscopic apparatus, and in boxes or cases for containing the same.

Dated July 31, 1857.

2080. Edward Evans, of Holywell, Flint, machinist, and George Potts Roskell, of Stockyn, near Holywell, gentleman. Improvements in reaping and mowing machines.

2082. Henry Bernoulli Barlow, of Manchester. Certain improvements in self-acting mules for spinning. A communication.

2085. Antoine Galy-Cazalat, engineer, and Adolphe Huillard, negociant, of Paris. An improved apparatus for and mode of manufacturing sulphuret of carbon, animal charcoal, and carbonic acid.

2086. Thomas Markland, of Hyde, Chester, warp dresser. Certain improvements in power looms for weaving.

2088. William Garnham, of Bedford-terrace, Chelsea. Improvements in pumping apparatus.

2090. John Beale, of East Greenwich, engineer. An improved construction of rotary engine, applicable for pumping and measuring fluids, or for the production of motive power.

Dated August 1, 1857.

2092. Charles Avril, of Paris, engraver. Improvements in the mode of forming the printing surface of blocks, plates, cylinders, lithographic stones, or other similar bodies made use of for printing in colours.

2093. Richard Coleman, of Chelmsford, agricultural machinist. Improvements in implements for ploughing, hoeing, and scarifying land, and in agricultural steam engines used for the traction of such implements.

2094. Guillaume Félix Aroux, of Paris, gentleman. Improvements in seed drills.

2096. Edwin Maw, of the Doncaster Iron Works, Yorkshire. Improvements in constructing railway crossings, points, and switches.

2098. William Hopkinson, of Huddersfield, engineer. Certain improvements in steam engines.

2100. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine* and Patent Agent. Improvements in circular sawing machinery. A communication from Messrs. Boccard and Coqueval.

2102. John Gray, of Hill-street, Peckham, engineer. Certain improvements in doors for furnaces and fire-places.

Dated August 3, 1857.

2104. John Elce, of Manchester, machinist, and John Leech, of the same place, mechanic. Improvements in self-acting temples for looms.

Dated August 4, 1857.

2106. Richard Birch, of Haughton, Lancaster, mechanic, and Robert Bradbury, of the same place, fur clearer. Improvements in machinery and apparatus for clearing and mixing hatters' furs.

2108. Alexander Prince, of Trafalgar-square, Charing-cross. A substitute for varnish, turpentine, and oil, in the manufacture or mixing of paints and pigments, to be employed for coating or covering wood, metal, glass, and other substances, to preserve them from atmospheric influences and fire. A communication.

2110. John Henry Johnson, of Lincoln's-inn-fields. Improvements in sewing machines. A communication.

2112. William Colborne Cambridge, of Bristol, agricultural implement maker. Improvements in the construction and working of endless travelling railways.

2114. Alfred Vincent Newton, of Chancery-lane. Improvements in umbrellas and parasols. A communication from M. Lévy and F. H. Blajot, of Paris.

Dated August 5, 1857.

2115. John Littlewood, of Church, near Accrington, calico printer, and Albert Schlumberger, of the same place, chemist. Improvements in producing printed or dyed colours from murexide on woollen fabrics or yarns or mixed fabrics, or yarns of wool and cotton.

2117. Sebastien Botturi, of Paris. The making of moveable chairs and seats of every kind and description, to be called Botturi's moveable chairs and seats.

2118. Thomas Lyne, of Malmesbury, Wilts, draper. An improved field stile or gate.

2119. Thomas Field, stay cleaner, of Spring-place, Kentish-town. Effecting improvements in parasols and umbrellas.

Dated August 6, 1857.

2120. Samuel Middleton and John Lowes, of Southwark. Improved apparatus for the extinction of fire in buildings.

2122. Alexander Dalgety, of Strangeways, Manchester, engineer. Improvements in rotary engines and pumps.

2123. Daniel Jones Crossley, of Hebden Bridge, York, manufacturer. Improvements in the treatment of certain textile fabrics called "pellones," and used for saddle covers, and in the machinery or apparatus for effecting the same.

2124. Ellis Rowland, of Manchester, engineer. Certain improvements in steam engines.

2125. William Gilmour, of Dalbeth, N. B., gardener. Improvements in obtaining motive power.

2126. Thomas Lawley, of Wolverhampton, japanner. Improvements in ornamenting articles made of tin plate and of other bright metals.

2127. John Parker, of Bradford, York. Improvements in the means of supplying or feeding steam boilers with water, whereby a great saving of fuel is effected.

Dated August 7, 1857.

2129. John Bradley, of Radcliffe, Lancaster, engraver. Certain improvements in machinery or apparatus for engraving metallic cylinders or rollers employed for printing calico and other surfaces.

2131. Alfred Vincent Newton, of Chancery-lane. Improvements in mules for spinning. A communication.

Dated August 8, 1857.

2133. William Irving Holdsworth, of Shaw Lodge Mills, Halifax, York, worsted manufacturer. Improvements in weaving woollen damasks. A communication.

2135. Isaac Oschinsky, of Old Broad-street, manufacturer. An improved soap, to which he gives the name of "rheumo-arthritii soap."

2137. John Anderton, bookkeeper, Jonas Foster Rushworth, bookkeeper, and Joseph Benn, mechanic, all of Queenshead, York. Improvements in machinery for moulding, cutting, and carving wood and stone.

Dated August 10, 1857.

2139. James Bertram, of Edinburgh, engineer, and John Louis Jullion, of Foots Cray, Kent, analytical chemist. Improvements in the manufacture of paper.

2143. Amherst Hawker Renton, of Buckingham-street, Adelphi, civil engineer. Improvements in apparatus for steering vessels. A communication from H. Perle, E. Bellamy, and F. Sterling, jun., of Bourdeaux.

Dated August 11, 1857.

2145. George Chambers, of Cheapside, merchant. Improvements in separating cinders from ashes and economizing fuel.

2149. William Edward Newton, of Chancery-lane. Improvements in pickers for looms. A communication.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," August 25th,* 1857.)

1027. T. Wilton and J. Huggett. An apparatus for regulating the flow or supply of gas.

1034. T. J. Searle. Improvements in fastenings for window sashes.

1045. C. Barlow. Consuming the smoke and gases of furnaces, and at the same time furnishing a hot-air blast, being a smoke and gas-consuming hot-air blast furnace. A communication.

1067. B. F. Brunel. Improvements in raising sunken vessels and other submerged structures and articles, and in machinery and apparatus employed therein.

1074. T. and F. Sugden. Improvements in sewing machines.

1076. W. Weild. Improved arrangements for printing, dyeing, colouring, or staining, and otherwise preparing yarns or threads for various manufacturing purposes.

1077. R. Hindle. Improvements in that apparatus used in calico and other printing, known as the sieve.

1079. I. Sherwood and J. B. Wayne. Improvements in certain apparatus to be attached to vehicles for the purpose of acting as a check upon the drivers or conductors of such vehicles by indicating the number of passengers carried and the distance each has travelled.

1081. J. Hands. Improvements in kilns and in furnaces and flues for withdrawing air and vapours from drying and other chambers.

1094. T. Harris. Certain improvements in the mode of constructing and applying horse shoes.

1098. W. H. D. Granville. Improvements in fire-arms and in the means of loading the same.

1114. W. E. Newton. Certain improvements in meters for measuring the flow of gas water or other fluids. A communication.

1128. T. Burton and S. Lord. An improved self-acting steam-pipe regulator, which is also applicable to drying cylinders and other similar purposes.

1134. R. Taylor, R. Worswick, and J. Lovatt. Improvements in railway chairs, and in the mode of securing the ends of rails therein.

1146. G. Scarr and J. Pollard. Certain improvements in power looms for weaving.

1152. A. D. Bishop. An improvement in the construction of windlasses.

1170. T. Mann. Improvements in horse powers.

1176. W. Pickstone. An improvement in preparing or manufacturing dyeing matter, peculiarly applicable to cotton and other vegetable fibres, and useful when dyeing and printing other fibres and fabrics. A communication.

1180. C. Cowper. Improvements in electro-plating and depositing metals. A communication.

1214. L. H. Spooner. A new or improved manufacture of paper and paper pulp.

1216. T. Baldwin. Improvements in indicators for registering pressure.

1226. J. Anderson. Improvements in the treatment, application, and use of maize or Indian corn.

1290. R. Bennett. A new or improved method of papering needles, or making up needles for sale.

1311. W. P. Miles. An improved gauge cutting machine.

1390. C. Cowper. Improvements in preparing solutions and extracts of the colouring matter of madder and other tinctorial substances for dyeing and printing. A communication.

1615. W. E. Newton. An improved life-boat. A communication.

1645. J. Whitworth. Improvements in ordnance, fire-arms, and projectiles, and in machinery employed in their manufacture.

1689. P. Kürten. An improved process of manufacturing mottled soap.

1712. S. Pincoffs. Improvements in treating madder, munjeet, or any of their preparations.

1765. J. Juckes. Improvements in washing machinery.

1845. C. Orphin and E. Lyons. Certain improvements in table and other lamps.

1926. W. Smith. Improvements in steam engines for giving motion to agricultural implements.

1966. E. Bertin. A new manufacture of fibre suitable for the purposes to which hemp and flax are usually applied.

1972. W. Jones. Improvements in moulding for casting metals.

1991. W. Cliff. A new system of applying the air from the bellows and other means to the forge. A communication.

2002. W. E. Newton. Improved machinery for feeding flour, and mixing and kneading dough for the making of bread and biscuits. A communication.

2015. J. Hall. Improvements in the mode of preventing incrustation in boilers.

2025. W. Hudson and C. Catlow. Certain improvements in looms for weaving.

2062. J. Clay. An improvement or improvements in saddles.

2085. A. Galy-Cazalat and A. Huillard. An improved apparatus for and mode of manufacturing sulphuret of carbon, animal charcoal, and carbonic acid.

2097. T. Rickett. Improvement in implements for cultivating land.

2110. J. H. Johnson. Improvements in sewing machines. A communication.

2131. A. V. Newton. Improvements in mules for spinning. A communication.

2133. W. I. Holdsworth. Improvements in weaving woollen damasks. A communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1835. William Henry Smith, Henry Bessemer, and Robert Longsdon.
1837. John Grist.
1846. James Lamb Hancock.
1851. John Norton.
1853. Matthew Curtis, William Henry Rhodes, and John Wain.
1854. Aristide Balthazard Bérard.
1856. Julien Louis Pierre Jean Baptiste Hector Bouvet.
1860. Thomas Hayter.
1872. John Gedge.
1873. William Smith and Thomas Phillips.
1884. John Gray.
1894. Pierre Amable de Saint Simon Sicard.

LIST OF SEALED PATENTS.

Sealed August 18, 1857.

518. William Gossage.
607. Frederick William Mowbray.
616. Thomas Gray.
718. William Edward Newton.
784. Nathan James Greenwood.
1472. Henry Whatley Tyler.
1534. George Watson Pye and Thomas Oldknow.
1646. James Buchanan.
1654. Malcolm Macdonald.
1770. Joseph Exley and John Ogden.

Sealed August 21, 1857.

511. John Barber.
513. John Turner.
519. Auguste Quidde and Charles Mayet.
525. Francis Coniliane La Croix.
526. Guiseppe Devincenzi.
527. James Edward Shearman.
528. John Kirkham.
534. George Barnett.
537. Richard Archibald Brooman.
567. Joseph Slatterie Edwards.
595. Richard Archibald Brooman.
596. Henry Duncan Preston Cunningham.
603. William Pedder.
629. Robert Mair.
631. Gerard Ralston.
642. Jean Louis Frédéric Bardin.
659. Luke Barton and Edwin Stanley Brookes.
799. James Edward Cole.
1481. James Edgar Cook.
1547. Stanislaus Hoga.
1635. William Edward Newton.
1695. Frederick Warner.

Sealed August 25, 1857.

577. Edward Mucklow.
579. William Henry Thornthwaite.
581. Samuel Draper.
585. Edgar Heale and Mary Ann Heale.
633. William Hartley and Thomas Hardman Farrar.
931. Thomas Craddock.
1019. John Matthews.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
July 24	4010	J. Welch & J. S. Margetson	Cheapside	Shirt collar.
25	4011	White and Bull	Clerkenwell	Postage-stamp damper.
27	4012	A. Stokes	Birmingham	Curtain support.
28	4013	J. Hutchings	Brompton	Knee protector.
Aug. 11	4014	W. J. Brown	Nottingham	Press.
14	4015	H. S. Gilling	Upper Charles-street	Watch protector.
15	4016	J. King	Reading	Connecting parts of gutters, &c.

PROVISIONAL REGISTRATIONS.

July	28	910	G. G. A. L. M. Schelhorn	Birmingham	Penholder.
	30	911	C. F. Pollard & A. Prince	Brompton	Photographic plate holder.
Aug.	1	912	T. Groom	Southwark	Stays.
	3	913	P. Tagliacozza	Broad-street-buildings	Grating machine.
	5	914	S. Jones	Holborn	Chain pocket to prevent picking, &c.
	,,	915	T. Williams	Wales	Churn.
	10	916	W. Smith	Golden-square	Hinge case.
	,,	917	G. Hogg	St. Luke's	Watch protector.
	13	918	R. Williams	Victoria-park	Envelope.
	,,	919	T. Lucas	Camberwell	Gas carburizer.
	21	920	J. Lawrence	Blackfriars	Handle for bed pans.
	24	921	J. Nuttall	Cheapside	Fur glove.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1778.] SATURDAY, SEPTEMBER 5, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

TERRY'S MACHINERY FOR SAWING, SPLITTING, AND BINDING FIRE-WOOD.

Fig. 1.

Fig. 2.

TERRY'S MACHINERY FOR SAWING, SPLITTING, AND BINDING FIRE-WOOD.

Among the most recent applications of machinery to the minor domestic processes, is an invention for which Mr. R. Terry, of Great George-street, Westminster, has obtained a patent, and which consists in sawing, splitting, cutting, and binding into bundles the wood used for kindling ordinary fires, by suitable machines.

His first operation towards producing the bundles of sticks is to cause the rough wood to pass through the saw mill, shown in fig. 1, which is a side view partly in section. The wood is first placed on the inclined table, A A, down which it slides till it be taken up by the drum, B B, provided with a number of projections, *a a*, against which the wood is driven by the action of the three or four circular saws, *s s*, fixed on the spindle, C, and driven by a strap passing over a pulley on the spindle, C. The saws cut downwards against the drum, tending to move it round its axle, *k*. To prevent this motion being too rapid, he connects the saw spindle with the drum axle by means of the inclined shaft, G, and the worms and worm wheels, E, F, H, and I. The wood passes thus through the saws at a speed always proportionate to that of the saws, and is delivered on the table, R, cut into lengths equal to the distance between the saws. These lengths or blocks are then let down the shoots, L L L, of the second part of the machinery, termed the splitting mill, shown in fig. 2, which is a side view partly in section.

About half way down the shoots, L L, he places a sliding carriage, N N, working horizontally, and to which are attached four sets of bars, *l l*, &c., three bars to each set, and also a double-edged cutter, M. The blocks in the shoots, L L, rest on the bars, *l l* (which are placed rather lower than the edge of the cutter, M) until the cutter, M, enters into the lower block and splits off a slab, which then falls into the lower shoot, where it meets with a series of cuts from a second cutter, P, which is vertical, and fixed also to the carriage, N N, the whole being driven by the crank shaft, O. The cuts take place against the sides of the shoots alternately, and the thickness of the slab is regulated by the difference of level between the bars, *l l l*, and the edge of the cutter, M. The cutter, P, is made to split off pieces of about equal sizes, usually called sticks, by the motion of the feeder, C C, pressing against the edge of the slabs, and driving them at each stroke of the cutter against the feed plate, Q, which is fixed in advance of the cutter, and also at a distance at the back of it equal to the thickness intended to be given to the sticks. The cutter, P, thus is made to separate a stick from each slab, of which the lower shoot is full, and the piece, C C, is so formed, that for each new slab entering it one slab shall have been wholly reduced to sticks and be discharged, thus keeping the lower shoot always free. The sticks fall then into the receptacle, R, and are carried off by it to the next machine. The feeder, C C, is moved by the eccentric, *d d*, keyed to the shaft, *e e*, which shaft is connected by means of a series of toothed wheels, *f f*, to the crank shaft, O, by which is moved also the screw, G, and by it the receptacle, R. The patentee uses a series of these carriages to convey the sticks to the next machine, where, by releasing a catch, their contents are discharged in a shoot, and they return down an incline to the splitting machine, and receive another load; thus the delivery from one machine and the feed to the other continues. To cause the sticks as they are removed to lay all in one direction, the rails on which the carriage travels are notched, thus producing a jarring motion, which effects this purpose.

The sticks, being discharged in the shoot, fall gradually into a horizontal channel, in which a piston moving to and fro by the action of a lever and weight, forces at each alternate movement a certain number of sticks (about sufficient for one bundle) from the bottom of the shoot to a position opposite the circular opening, compressing them firmly. The piston then moves forward and drives them through the aperture till about half their length projects beyond the opening, thus producing the shape of a bundle, around which the wire from the reels is then passed, firmly twisted, and finally severed, so that the next coming bundle may force the finished one out. To bind the sticks together in the shape given to them by the aperture, he uses two metallic wires taken from reels, and passed through conducting rods, and unites them by twisting the ends together. This first manual operation will have to be repeated whenever new reels are put on. He then causes the rods conducted to descend, increasing the distance between them by suitable means until the wire is in a position to allow the bundle issuing through the aperture to pass over it. The wire being then under the bundle, the conducting rods move back to their original position by the return motion of a lever, and are then caused to revolve by a wheel through which they pass, and thus close the wire over the bundle by a second twist. To separate the wire binding the bundle from that in the conducting rods, he uses a horizontal cutter attached to a rod, which passes through a spindle and out at the top, where a bracket is fixed to it. The rod, being fixed to the wheel conducting rod, revolves with it, and drives

by a pinion a wheel which is provided with a stud causing the bracket to describe a quarter of a circle, thus moving also the cutter, and severing the wire at the middle of the part twisted over the bundle, so that the wires from the reels remain united and ready to be placed round the next bundle. The wire is thus bound round the bundle by two twists, and in order to keep the length of wire between the reel and bundle always stretched, he applies springs to the reels.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The twenty-seventh meeting of this Association commenced at Dublin on the 26th ult., and the Rev. Humphrey Lloyd, D.D., was elected President. In his opening address, after a few apt introductory remarks, he proceeded to review the steps recently taken in the physical sciences. The Rev. Dr. first referred to the recent discoveries of numerous small planetary bodies. The known number of these bodies is now forty-five. Their total mass, however, is very small. The diameter of the largest is less than forty miles, while that of the smallest (Atalanta) is little more than four. These discoveries have been facilitated by star-maps and star-catalogues, the formation of which they have, on the other hand, stimulated. Two very extensive works of this kind are now in progress—the Star-Catalogue of Mr. Chacornac, made at the Observatory of Marseilles, in course of publication by the French Government; and that of Mr. Cooper, made at his observatory at Markree, in Ireland, now being published by the help of the Parliamentary grant of the Royal Society. It is a remarkable result of the latter labour, that no fewer than seventy-seven stars, previously catalogued, are now missing. This is to be ascribed in part to the errors of former observations; but it seems reasonable to suppose that, to some extent at least, it is the result of changes actually in progress in the Sidereal System. The sudden appearance of a new fixed star in the heavens, its subsequent change of lustre, and its final disappearance, are phenomena which have at all times attracted the attention of astronomers. About twenty such have been observed.

He next referred to the remarkable discoveries recently made respecting the relation of the solar spots and terrestrial magnetism. According to the observations of Schwabe, continued without intermission for more than thirty years, the magnitude of the solar surface obscured by spots increases and decreases *periodically*, the length of the period being eleven years and forty days. This fact, and the relation which it appears to bear to certain phenomena of terrestrial magnetism, have attracted fresh interest to the study of the solar surface; and, upon the suggestion of Sir John Herschel, a photoheliographic apparatus has lately been established at Kew, for the purpose of depicting the actual macular state of the sun's surface from time to time.*

The Rev. President remarked, that the path of astronomical discovery is obstructed much more by the earth's atmosphere than by the limitation of telescopic powers, and the Association has urged upon Her Majesty's Government the scientific importance of establishing a large reflector at some elevated station in the southern hemisphere. In the mean time, and to gain (as it were) a sample of the results which might be expected, Prof. Piazzi Smyth undertook, last summer, the task of transporting a large collection of instruments—meteorological and magnetical, as well as astronomical—to a high point on the Peak of Teneriffe. The astronomical advantages gained may be inferred from the fact, that the heat radiated from the moon, which has been so often sought for in vain in a lower region, was distinctly perceptible, even at the lower of the two stations.†

* The following is the history of this apparatus; —On the 20th of May, 1854, B. Oliveira, Esq., F.R.S., placed the sum of £50 at the disposal of the Council of the Royal Society, to be appropriated by the Council in the interests of science. Mr. Oliveira further stated, that he might probably in future years offer a similar sum if the mode of its disposal appeared to him eligible; and an application having at the same time been made by the Kew Committee for the sum of £150 to erect a photographic apparatus for registering the position of the spots in the sun's disc, as suggested by Sir J. Herschel, the Council devoted to this purpose the donation of Mr. Oliveira, and proposed, should it be continued, to apply it for the next two years in replacement of the sum of £100, which the Council in the mean time advanced from the donation fund of the Royal Society, that the undertaking might not be delayed. This arrangement was approved by Mr. Oliveira, and the apparatus has, under the direction of Warren De la Rue, Esq., F.R.S., been completed by Mr. Ross, at the cost of about £180.

The photographing of such minute objects as the sun's spots will require at all times the utmost skill and care of an accomplished photographer, even when the telescope has been fairly started. The difficulties yet to be mastered must occupy some considerable time. The first attempts have been confined to the production of negative photographs; but, in consequence of the imperfections always existing in the collodion film, it has been deemed advisable to make attempts to produce positive pictures, and recourse may ultimately have to be made to the Daguerreotype process.

† See *Mech. Mag.*, vol. lxv., p. 388.

The researches relative to the figure of the earth and the tides are intimately connected with astronomy, and next received attention. The results of the Ordnance Survey of Britain, so far as they relate to the earth's figure and mean density, have been lately laid before the Royal Society by Col. James, the superintendent of the survey. The ellipticity deduced is $\frac{1}{299\cdot33}$. The mean specific gravity of the earth, as obtained from the attraction of Arthur's Seat, near Edinburgh, is 5·316; a result which accords satisfactorily with the mean of the results obtained by the torsion balance.

After reviewing Professor Haughton's labours in connection with the theory of the tides, and discussing General Sabine's and Professor Kriel's investigations respecting terrestrial magnetism, the President stated that the most important step which has been recently taken in this country to advance the science of meteorology has been the formation of a department connected with the Board of Trade for the collection and discussion of meteorological observations made at sea. The practical results of a similar undertaking in the United States are now well known. The charts and sailing directions published by Lieut. Maury have enabled navigators to shorten their passages, in many cases by one-fourth of the time, and in some even to a greater extent. An establishment has been organised, and placed under the direction of Admiral Fitzroy. Agents are established at the principal ports for the supply of instruments, books, and instructions; and there are now more than 200 British ships so furnished, whose officers have undertaken to make and record observations, and to transmit them from time to time to the Department. Holland is taking similar steps; and the Meteorological Institute of that country, under the direction of Mr. Buys Ballot, has already published three volumes of nautical information, obtained from Dutch vessels in the Atlantic and Indian Oceans. For the purposes of meteorological science, this system cannot be considered as complete until observations on land are included.

He next mentioned as the most important of the recent additions to the theory of light those made by M. Jamin. Mr. Airy showed that diamond reflected light in a manner similar to metals; and Mr. Dale and Prof. Powell extended the property to all bodies having a high refractive power; but it was not until lately that M. Jamin proved that there is no distinction in this respect between transparent and metallic bodies; that all bodies transform plane-polarized into elliptically polarized light, and impress a change of phase at the moment of reflection. Prof. Haughton has followed up the researches of M. Jamin, and established the existence of circularly-polarized light by reflection from transparent surfaces. It is well known that the refractive index of bodies increases with their density; and *the theory of emission* has even expressed the law of their mutual dependence. That theory, it is true, is now completely overthrown by the decisive *experimentum crucis* of MM. Fizeau and Foucault. It was, therefore, probable, *à priori*, that this law—the only one peculiar to the theory—should be found wanting. Its truth has recently been put to an experimental test by M. Jamin. Water, it is known, has its maximum of density at about 40° of Fahr.; and accordingly, if Newton's law were true, its refractive index should also have a maximum value at the same temperature. This has been disproved by M. Jamin, by observing the interference of two rays, one of which has passed through air, and the other through water; and thus the last conclusion of the *emission theory* has been set aside. The speaker mentioned, as one of the latest of the marvels of photography, that M. Poitevin has succeeded in producing plates in relief, for the purposes of engraving, by the action of light alone. The process depends upon the change in the affinity for water, produced by the action of light upon a thin plate of gelatine, which is impregnated with bichromate of potash.

The only mechanical hypothesis, (so far as I am aware, continued the President) which is consistent with the present state of our knowledge of the phenomena of heat, is the theory of molecular vortices of Mr. Rankine. In this theory all bodies are supposed to consist of atoms, composed of nuclei surrounded with elastic atmospheres. The radiation of light and heat is ascribed to the transmission of oscillations of the nuclei; while thermometric heat is supposed to consist in circulating currents or vortices, amongst the particles of their atmospheres, whereby they tend to recede from the nuclei, and to occupy a greater space. From this hypothesis Mr. Rankine has deduced all the laws of thermo-dynamics, by the application of known mechanical principles. He has also, from the same principles, deduced relations (which have been confirmed by experiment) between the pressure, density and absolute temperature of elastic fluids, and between the pressure and temperature of ebullition of fluids. The dynamical theory of heat enables us to frame some conjectures to account for the continuance of its supply, and even to speculate as to its source. The

heat of the sun is dissipated and lost by radiation, and must be progressively diminished unless its thermal energy be supplied. According to the measurements of M. Pouillet, the quantity of heat given out by the sun in a year is equal to that which would be produced by the combustion of a stratum of coal seventeen miles in thickness; and if the sun's capacity for heat be assumed equal to that of water, and the heat be supposed to be drawn uniformly from its entire mass, its temperature would thereby undergo a diminution of 2·4° Fahr. annually. On the other hand, there is a vast store of force in our system capable of conversion into heat. If, as indicated by the small density of the sun, and by other circumstances, that body has not yet reached the condition of incompressibility, we have, in the future approximation of its parts, a fund of heat probably quite large enough to supply the wants of the human family to the end of its sojourn here. It has been calculated that an amount of condensation, which would diminish the diameter of the sun by only the ten thousandth part, would suffice to restore the heat emitted in 2,000 years. Again, on our own earth, *vis viva* is destroyed by friction in the ebb and flow of every tide, and must therefore reappear *as heat*. The amount of this must be considerable, and should not be overlooked in any estimation of the physical changes of our globe. According to the computation of Bessel, 25,000 cubic miles of water flow in every six hours from one quarter of the earth to another. The store of mechanical force is thus diminished, and the temperature of our globe augmented by every tide.

The Rev. President then offered important remarks upon the future of physical science (which we shall probably publish hereafter, as they bear upon the recent discussion on Professor Faraday's lecture which appeared in our pages) and, after having noticed a few prominent facts connected with chemistry and geology, concluded by explaining the administrative measures adopted by the Association for the advancement of science, and the general business of the meeting.

Reports of the various papers interesting to our readers submitted to the Association will hereafter appear as usual, with the words "British Association, 1857," appended in a foot-note.

STEAM SHIP ECONOMY.

SUGGESTIONS FOR STATISTICAL INQUIRY INTO THE EXTENT TO WHICH MERCANTILE STEAM TRANSPORT ECONOMY IS AFFECTED BY THE CONSTRUCTIVE TYPE OF SHIPPING, AS RESPECTS THE PROPORTIONS OF LENGTH, BREADTH, AND DEPTH.

BY CHARLES ATHERTON, ESQ., CHIEF ENGINEER OF HER MAJESTY'S DOCKYARD, WOOLWICH.*

In the present paper I propose to continue the subject matter of my former dissertations, by showing the extent to which the weights carrying capability of ships of given tonnage, whether rated by the gross register tonnage (new measure) under the Merchant Shipping Act of 1854, or by the tonnage builders' measure O. M. (also commonly called "burden," and still generally in use though legally superseded in 1835,) is dependent on the relative proportions of length, breadth, and depth to which ships may be constructed, and it is submitted for the consideration of the Association that this point of inquiry comes to be of special importance, seeing that the tendency of the present times to build vessels of great magnitude as respects length and breadth, whilst the load draught is restricted by local circumstances within the definite limit of the minimum depth of water of the ports to be frequented, has a direct tendency to involve a condition of things as respects proportions of build adverse to PUBLIC INTERESTS, for the public will have to bear the brunt of freight charges proportional to the cost expenses that may be incurred in the general administration of shipping affairs. We may just as well assert that the public have no interest in the efficiency of our army and navy as that it has no interest in the efficiency of our commercial shipping. Rates of freight (excepting on occasions of national emergency) must be ruled on the aggregate by the general average cost at which the general service of mercantile transport is actually performed, whether it be well or ill performed, and the general introduction of proportions of build which can only perform their service at high rates of freight above the prime cost rates which would duly remunerate vessels of superior

* This paper was presented to the British Association, but the reading of it was opposed. We have not yet learnt whether it was read or not. The previous papers of Mr. Atherton on the above subject have received so much prominence, and have been so thoroughly discussed in our pages, that we have omitted from the present paper a few passages which constitute a *resumé* of the former. We have also omitted two elaborate Tables which, though valuable in themselves, are sufficiently discussed in the text for general purposes.

type involves pecuniary considerations that may well form the subject of special statistical inquiry to be prosecuted at the instance of the British Association. The application of statistical science in connection with shipping as a means of inquiry into the principles of Mercantile Steam Transport Economy is, I may say, a new subject of inquiry, to which the British Association, and, I must add, the Society for the Promotion of Arts, Manufactures, and Commerce, have given public vitality. The question of Maritime Transport Economy has a bearing on public interests analogous to the operation of the rail and the telegraph.

A further object of this paper is, that by means of a table which has been prepared to show the mutual relations which subsist in ships of given variations of build between tonnage builders' measurement, O. M., gross register tonnage, weight tonnage, or the capability of ships to carry weight of cargo, and the corresponding displacement when ships are loaded down to a determinate load line; and a second table showing the mutual relations of displacement, power, and speed, we may thus have the means of connecting through the intermediate element "displacement" the two tables, thus establishing the mutual relations within the limits aforesaid between builders' tonnage, gross register tonnage, and weight or cargo tonnage, with the power required to attain a given speed, thus enabling us to show the bearing of proportions of build as affecting Mercantile Steam Transport Economy.

In the first place, therefore, before entering on this exposition, and in consideration that persons generally, even amongst those who devote their time to popular and statistical studies, and to scientific pursuits, and even assume the responsibilities of legislation on shipping, are not familiar with the technical meaning of the terms tonnage and burden, which are of such frequent recurrence in discussing the properties of shipping, as compared with the ordinary and unsophisticated meaning of those words, and are actually and unconsciously misled by those terms, when used technically in shipping sophistry, having a signification quite at variance with their ordinary meaning, I will endeavour to dispel this mystery by a few remarks in explanation of the terms "tonnage and burden," which, above all other terms, are most amenable to the foregoing singular imputation, namely, that their technical meaning is directly at variance with the ordinary signification of the said words; for example, ship's "tonnage" is not spelt with a U, "tunnage," and we all know that a "Ton," as distinguished from "Tun," popularly signifies 2240 lbs. weight, or 20 cwt., each cwt. being 112 lbs. The ordinary acceptation of the word "ton implies an unit of weight, not of measure. Thence it is popularly inferred that the "tonnage" of a ship means the number of tons weight which constitute the proper load of a ship; but what is a ship's tonnage as implied in the terms tonnage O. M., tons burden, register tonnage? It has nothing whatever to do with weight. By the old law, termed builders' measurement O. M., which, though legally superseded in 1835, is still practically in use, and constitutes to this day the rule which, even in the Government service, generally regulates the builder's contract price of shipping, the measurement of this tonnage is regulated by the length of the ship and its breadth only, taking no cognisance of depth. It has nothing whatever to do with the load draught of water for which a ship may be constructed. Provided that the length and breadth of two ships be the same, the builders' tonnage O. M. will be the same, though the load draught of one ship be 30 feet and of the other only 3. This same tonnage, builders' measure O. M., is also frequently called by the equally delusive term "burden," though, as above shown, it has nothing to do with burden; for example, in shipping advertisements we see daily that "tons burden" is a designation by which ships are commonly advertised. It is true that parliament abolished that law of tonnage, builders' measurement O. M., or the so-called "burden," in 1835, but, nevertheless, the government have continued to uphold the rule (builders' measurement) as the base of their ship-building contracts, and ships, as respects their comparative size, are still only known to the world generally by their so-called tonnage or tons burden, or builders' measurement O. M. No steps having been taken by the Government to discontinue and forbid the use and adoption of the old law of measurement, though repudiated by statute in 1835, it has continued to prevail, and merchants, following the example of the government, make it the general base of building contracts to the present day.

It is, therefore, submitted for the consideration of the British Association, that the statute abolition of tonnage builders' measurement O. M., also called "burden," ought not to be permitted to lie dormant.

It should be expressly decreed that the said builders' measurement O.M. is not legally binding in any contract, either for the building, or freighting, or chartering of ships, and that the definition and measurement of "tonnage" shall be in accordance with the existing law, viz., the Merchant Shipping Act of 1854, subject to such amendments thereof and additions thereto as may be found necessary to render the

Act complete for all the purposes of shipping registration.

And now, what is Tonnage Registration under the new law—the Merchant Shipping Act of 1854? To begin with, vessels constructed previously to 1854 are permitted, at the option of their owners, to retain their former tonnage or be measured under the new law, and be registered accordingly, and the statistics or Parliamentary returns of shipping do not show to what extent this privilege, of optionally withholding the former registration, has been acted upon, so that our present registration under the new law, the Act of 1854, is a mixed registration, and we do not know the ingredients thereof or their proportion, but the measurement under the new law of all ships built since May, 1855, is an internal measurement, no notice whatever being taken of external measurement, or of the light draught line or constructor's load line, or any limitation thereof assigned by reference to "freeboard;" and, consequently, tonnage under the new law, the Act of 1854, does not give the weight-carrying capability of ships, nor any comparison thereof, if of different types of form, and of different build as respects the weight of the materials employed; but if the law does not give the weight-carrying capability of the ship, the question is—What does it give? It gives an admissibly correct measurement of the internal capacity of ships, but calls this capacity "TONNAGE," giving a new signification to the word ton, for each 100 cubic feet of this internal space of the ship available for holding cargo is called a ton of tonnage. Tonnage is, therefore, a mere measurement of space, not of weight. Then, again, as regards cargo, even a ton of cargo is not always rated as 20 cwts. The freight of goods is charged either by measurement or by weight, and the same word TON is applied in all cases; 100 cubic feet constitute a ton of shipping; 40 cubic feet of some kinds of goods, and 50 feet of others, constitute a ton of measurement goods; and cargo is rated accordingly for freight, provided the said measure do not weigh a ton. 100 cubic feet of light goods may, therefore, be stowed in one ton of shipping, and be rated for freight at 2½ tons; that is, a ship of 1,000 tons register tonnage may be expected to stow 2,500 tons of measurement cargo, or, better still, 1,000 tons weight of heavy goods, and fill up with 2,000 tons measurement of light cargo, and thus go to sea with this 3,000 tons of freight, no limitation being assigned to draught. Such are the anomalies of tonnage, and yet we talk of statistics based on tonnage; and what is the consequence of this abuse of the word ton? Why, in times of war, our tonnage registration of shipping not only affords no reliable data, but actually deceives as to the capabilities of vessels for carrying ordnance and such like heavy military stores. Experience of the past three years has abundantly shown how great would be the advantage to the public if, in times of war and emergency, when there is no time for the readmeasurement of shipping, and when shipping must be chartered or purchased at any price, our registration of shipping were available, like a tabular ready-reckoner, for giving the Government a correct idea of the capability of every ship for conveying weight of cargo, in addition to the present registration of capacity for holding cargo, and, consequently, a comprehensive view of the value of ships for military transport service embracing both weight and roomage.

The statistical insufficiency of the present system of shipping registration as a record of the capability of ships, is shown by the following table (which was prepared for exhibition by the Author).

In this Table it will be observed that twelve vessels, (say A, B, C, &c., to M,) are all of the same builders' tonnage, O. M., namely, 1,000 tons; that we have three vessels (A, B, C), whose length is four times the breadth of beam; three vessels (D, E, F), whose length is six times the breadth; three vessels (G, H, I), whose length is eight times the breadth; and three vessels (K, L, M), whose length is ten times the breadth; and that, in each set of three vessels, the load-draught of water is taken at two-thirds of the breadth, half the breadth, and one-third of the breadth; so that in this table we have a gradation of proportions, the length varying from four times to ten times the breadth, and the load-draught varying from two-thirds to one-third of the breadth, which limits embrace nearly all the proportions of shipping in mercantile use. The arbitrary elements of construction on which the calculations have been prosecuted are explained in the various headings. The freeboard, or non-immersed depth above the load-draught line has, in each case, been taken at one-fortieth of the length, plus one-twelfth of the breadth of beam. There is no recognized rule for the determination of this element. Constructors of shipping follow their own rules or their own caprice in determining freeboard or the position of the construction load-line. The above combined proportions of length and breadth have been adopted, as giving a progression which, it is believed, will meet the ordinary allowance of freeboard at which loaded ships of all sizes are sent to sea. The various elements of construction are believed to be closely approximate to ordinary practice, and the ratios of nominal tonnage to

actual weight-carrying capability are therefore approximately such as would result from the ordinary build of shipping.

Now, on comparing the ratios which result from the constructive proportions of the ships (A, B, C, &c., M) we have the following results:—1st, it appears that, taking builders' tonnage at 100, the ratio of register tonnage varies from 85 to 51 in ships (A,B,C,) of which the length is four times the beam, and from 94 to 63 in ships (K,L, M,) of which the length is ten times the beam, that is, taking the extreme cases embraced within the limits of this table, a ship of type (K) will have a register tonnage of 94 tons for every 100 tons builders' measure; but a ship of type (C) will have only 51 tons register for each 100 tons builders' measure. It also appears with reference to builders' tonnage O.M., taken at 100, that the capability for carrying weight fluctuates from 131 tons weight down to 33 tons weight per 100 tons of builders' measure O.M., or a ship of 1,000 tons builders' tonnage of the type (A) will have four times the weight-carrying capability that is afforded by a ship of 1,000 tons builders' tonnage of the type (M).

With reference to register tonnage (gross), new measure, under the Act of 1854, taken at 100, it appears that the capability for carrying weight varies from 177 tons down to 52 tons per 100 tons of register tonnage; or a ship of 1,000 tons gross register tonnage of the type (A) will have nearly 3½ times the weight-carrying capability that is afforded by a ship of 1,000 tons gross register tonnage of the type (M).

With reference to weight tonnage, or the capability of ships to carry weight, it appears that, with the proportions of ship (A), each 100 tons of weight-carrying capability will require a vessel of 76 tons builders' measure O.M., or 65 tons gross register tonnage; but with the proportions of ship N, each 100 tons of weight-carrying capability will require a vessel of 303 tons builders' measure O.M., or 191 tons gross register tonnage.

With reference to the mutual relation of the load displacement and weight tonnage, it appears that, with the proportions of ship (A), each 100 tons of load displacement will give 57 tons of weight tonnage, but with the proportions of ship (M), each 100 tons of load displacement will give only 29 tons of weight tonnage, that is, a ship of 1,000 tons load displacement, on the type of ship (A), will carry double the weight that would be carried by 1,000 tons of displacement on the type of ship (M).

It might possibly be objected that the foregoing variations, which have all been calculated with reference to ships of 1,000 tons builders' measure, O.M., are not applicable to vessels of a different magnitude; therefore, to test the validity or otherwise of this remark, the same constructive elements have been applied to a ship (X) of 20,939 tons builders' measure, O.M., and 25,000 tons load displacement, the length of this ship (X) being six times the beam, and the load draught one-third of the beam, this type or proportion being the same as that of a ship (F). On comparison of the ships (X) and (F), it will be found that the ratios of builders' tonnage, register tonnage, weight tonnage, and load displacement, are closely similar throughout: for example in ship (F), each 100 tons load displacement gives 42 tons of weight tonnage, but in ship (X) each 100 tons of load displacement gives 39 tons of weight tonnage. Hence, we may infer that the results of these calculations, showing the extent to which the weight-carrying capabilities of ships is irrespective of the nominal tonnage, whether it be builders' tonnage O.M., or gross register tonnage N.M., and is approximately dependent on the constructor's proportions of build, admit of general application to vessels of all sizes of the types referred to. Surely the above exposition is sufficient to establish the necessity of some legislative enactment under which builders' tonnage O.M., and register tonnage N.M., should not be permitted to co-exist as recognised measurements of the mercantile capabilities of shipping. Under existing circumstances, it is respectfully submitted for the consideration of the British Association, that a clause be introduced into the Merchant Shipping Act that the only legal signification of the word "tonnage" shall be the measurement prescribed by the said Act, and that no other signification of that term shall be legally binding in commercial transactions. Also, that the capability of ships for carrying weights, as measured with reference to some determinate free-board, be made an item of registration.

The ratios above set forth, as expressing the weight-carrying capability of ships, includes the whole weight available for engines, boilers, coal, consumable stores, and cargo; so that, as applied to steam ships, these ratios, as respects weight-tonnage for cargo chargeable for freight, assumes a new phase of great importance as affecting mercantile steam transport economy; and, for the purpose of inquiring into the modification thus introduced, the second Table has been calculated, showing the mutual relations of displacements, power and speed for vessels up to 25,000 tons load displacement, the speed varying from 6 knots up to 25 knots per hour.

The element, "Load Displacement,"

being common to both tables (which we may call A and B), we have, by the aid of these Tables combined, the means of showing the mutual relations between builders' tonnage O.M., gross register tonnage N.M., weight tonnage, load displacement, speed, and power of all vessels within the limits of the types or proportions of build referred to in Table A, and thus showing to what an extent mercantile transport economy by steam is affected by the proportions of length, breadth, and depth to which steam ships may be built. For example: let us compare a ship of the type, (D), namely length six times the beam, and load draught two-thirds the beam, having weight-carrying capability or weight tonnage of 2,000 tons, with a ship of the same capability for carrying weight, but of the type (I), namely, length eight times the beam, and load draught one-third the beam. By Table A it appears that the ship of type (D), of 2,000 tons weight tonnage, will be 1,680 tons builders' tonnage O.M., 1,400 tons gross register tonnage N.M., and 3,680 tons load displacement; and, by Table B, it appears that 950 indicated horse power would propel this ship at the speed of 10 knots per hour; the consumption of coal at the rate of $3\frac{1}{2}$ lbs. per indicated horse power per hour, would be 30 cwts. per hour; and, supposing the engines, boilers, &c., to weigh 1 ton weight per 5 indicated horse power, the weight of these will be 184 tons; this ship may, therefore, be expected, on the data of the said Tables, to make a passage of 3,500 nautical miles in 350 hours, consuming 525 tons of coal, and carrying 1,291 tons weight of freight cargo. But what would be the case with the vessel of 2,000 tons weight tonnage of type (I); it appears that the builders' tonnage, O.M., would be 5,120 tons, the register tonnage, N.M., 2,720 tons, and the load displacement 5,480 tons; and by Table B it appears that, to propel this vessel at 10 knots per hour, would require 1,240 indicated horse power, these engines weighing 248 tons, and the consumption of coals 39 cwts. per hour; so that, on the data of the said Tables, this ship on the type (I) may be expected to make the passage of 3,500 nautical miles in 350 hours, consuming 682 tons of coal, but carrying only 1,070 tons of freight cargo. Hence it appears that with vessels of type (D) we have expenses proportional to 1,400 tons register N.M., and 950 indicated horse power, with income proportional to 1,291 tons weight of freight; while with the ship of type (I) we have expense proportional to 2,720 tons register N.M., and 1,240 indicated horse power, with income proportional to only 1,070 tons weight of freight; that is, the comparative prime cost expenses of transport in these two cases (assuming the cost incidental to one indicated horse power to be equal to that of 1 ton of gross register tonnage), will be in the proportion of

$$\frac{1400 + 950}{1291} = 1{\cdot}82 \text{ to } \frac{2720 + 1240}{1070} = 3{\cdot}70,$$

or in the proportion of 1 to 2. Such is the effect of mere difference of proportion or type of build on mercantile steam transport economy. This example of a difference or extra cost of 100 per cent. on the prime cost rates of freight per ton weight of cargo conveyed on the same passage, and at the same rate of speed is evidently occasioned by the load draught of water being two-thirds of the beam in the one case, that of the vessel (D), and only one-third of the beam in the other case, that of the vessel (I), and yet we see that the type or proportion of small load draught in proportion to beam is a type or proportion of build, towards which the progressive increase in the size of shipping is gradually leading mercantile practice as exemplified in the most extraordinary maritime enterprise of the present day, the *Great Eastern*.

The mechanical advantage which attends progressive increase of size as measured by load-displacement, is conspicuously shown by Table B, whereby we observe, that a vessel of 250 tons displacement requires 274 indicated horse power to attain the speed of 12 knots per hour, being very nearly in the ratio of one ton displacement to one horse power; but, if the ship be 2,000 tons, the ratio of displacement to power to attain the same speed (12 knots) will be 2 to 1; with a ship of 9,000 tons it will be 3 to 1; and with a ship of 20,000 tons it will be 4 to 1. A ship of the reputed size of the *Great Eastern*, viz., about 25,000 tons load-displacement, will require *proportionally* only about one-fourth of the power to attain a given speed that would be required by a ship of 500 tons displacement. Hence the great advantage of size, provided the ship be of good type and can be always fully loaded; but, seeing that load-draught is limited by local circumstances and other considerations which may not limit the length and breadth, it becomes a matter of calculation to determine at what point the admitted advantages of size become neutralized with reference to any particular service by the limitation of load-draught in proportion to beam. Let us have all the advantages we can get without running into extremes, by which those advantages become sacrificed. Theory is a snare, unless it be commercially worked out to advantage.

Are not public interests involved in this matter, and is it not a matter of grave importance, meriting the attention of the British Association? I beg to conclude with the suggestion that it is only by statistics that the deficiencies of our present maritime system can be properly searched into and brought to light; and it is only by the force of statistical exposition that the required remedies can be devised. It is, therefore, respectfully submitted that the constructive type of shipping as respects the proportions of length, breadth, and depth, constitutes a subject of inquiry which merits the notice of the statistical section of the British Association.

SUBMARINE TELEGRAPHY.

To the Editors of the Mechanics' Magazine.

Gentlemen,—What with Indian affairs and the failure of the Atlantic cable, the public mind is much engaged with this subject, as yet but imperfectly understood. The vulgar notion seems to be that one telegraph system is as good as another for all or any circumstances, whatsoever they may be; that what is success in one case must of necessity be so in another, although widely different. It is not so, as has already been too frequently proved, and with a disgraceful loss of capital. What will do for 100 miles in shallow water is totally inapplicable for 1000 miles in deep.

A correspondent in the *Times* of the 18th, with hasty eagerness, suggests that a portion of what is saved of the Atlantic cable be forthwith purchased by Government, and laid between Malta and Alexandria. Before any further bungling takes place, or the Government be seduced to enter into such a transaction and lay such a line, which will be safe only in the sense of the Irishman's kettle, viz., that it is at the bottom of the sea! it is but right to state that such a cable as has been constructed for the Atlantic Telegraph Company, without a very considerable outlay upon it, is as unsuitable for the Mediterranean as it is for the Atlantic, for the simplest of all reasons—its specific gravity. It is, therefore, a mere stubborn throwing away of money, persisting to attempt the laying of ropes constructed on such principles in the depths of the Atlantic or Mediterranean.

Judging from past experience and the philosophy of common things, the chances of success are very remote indeed. And as the *Times* of April 22nd plainly states, "If the Atlantic cable does answer temporarily, it will not be due to the plan on which it is made, but in spite of it."

The recent and previous failures are strongly corroborative of a statement published by me, as far back as 1853, as to the requirements of an ocean telegraph, which was referred to in the *Times* (City article), Oct. 28th of that year, experience since only confirming the premises. The following is an extract:

It is almost unnecessary to observe that the various telegraphic arrangements at present in operation are quite inapplicable to a line of communication extending across the Atlantic, the instruments as well as the mode of obtaining the electromotive force being quite inadequate to such an undertaking; but, even assuming that these means were sufficient, the weight of the submarine conductor, as at present in use, would involve so large an outlay in the manufacture, and so much hazard and expense in laying, as to render it doubtful if such a line would ever be completed.

To carry this great work into effect it is necessary, in the first place, to have such a conductor as can be made at a moderate expense, and of *such a weight* that it may be laid with as *little risk as possible;* and, secondly, to employ such instruments and means of obtaining an electro-motive force as are *capable of working through so extensive a circuit.*

The electro-motive force by which it is proposed to work through so long a circuit is the "*induced current,*" *produced or obtained from an electro-magnet by induction.*

The peculiar arrangements adopted in obtaining, as well as the mode of applying this electricity to the working of a form of telegraph adapted to the present object, have been practically tested, and found to be more peculiarly adapted than any others to the working of so extensive a circuit.

I am, Gentlemen, yours, &c.,

Thomas Allan.

Adelphi-terrace, Aug. 28th, 1857.

TELEGRAPHIC COMMUNICATION WITH INDIA.

To the Editors of the Mechanics' Magazine.

Gentlemen,—At present all eyes are turned towards India. Every tax payer of the United Kingdom repeats to himself the pertinent queries of an Eastern correspondent, "Why are we so far from home? Why have we 9,000 miles between England and her Eastern dominions untraversed by a telegraph?" No one can read these queries without feeling somewhat of self-reproach as an integral part of the nation. What is pointed out now as a necessity was proposed years ago, and might, ere this, have been in active operation; but what can we expect when a national scheme of such vital importance meets with so cold a reception from the powers that be, as my Lord Palmerston vouchsafed to its consideration some short time back.

A telegraph to India is not simply a commercial speculation. The annihilator of time and space is in this respect an engine of Government; and what nation requires it so much as our own, whose minor seats of government are scattered all over the globe? In matters of government nothing is so ex-

pensive as ignorance. The money thus wasted would make a telegraph a dozen times over. The single consideration ought to be—how the interval of time between Great Britain and India can be annihilated at the earliest possible moment.

A direct communication should be established from London to Bombay by a chain of submarine lines from Falmouth *viâ* Gibraltar, Malta, Alexandria, Suez, Aden, and Bombay. By a continuous and independent system, such as this, the cost of the message between the termini would not only be reduced to a minimum comparatively, but the expense, delay, and espionage of the foreign lines of telegraphs across the continent of Europe would be entirely avoided, which of themselves render any telegraph system of communication with India, based on their co-operation, practically valueless to the commercial community.

Telegraphic communication with the various stations, *en route*, is also of the highest importance, not only to the commerce, but to the Government of Great Britain. The whole line of communication, from London to Bombay, might be completed within a twelvemonth at something under a million sterling.

I am, Gentlemen, yours, &c.,
THOMAS ALLAN.

1, Adelphi-terrace, Aug. 28, 1857.

BOAT-LOWERING APPARATUS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Out of your late fair and impartial review of my plan for disconnecting boats at sea, I observe that a correspondence has arisen between a party who styles himself "Spectator," and who is evidently attached to Mr. Clifford's interests, and another who aptly subscribes himself "Fairplay," who seems disposed to take an opposite view of the question they have thought fit to discuss.

Now, as long as a correspondence of the kind is conducted in a fair and unprejudiced spirit, and is confined to a little harmless sparring on the relative merits of two rival inventions, you will agree with me that none have any cause to interfere; in fact, a well-regulated controversy, through the medium of the public press, may be said to have a salutary tendency towards the public interest, inasmuch as it often serves to bring important facts to light, which might otherwise have remained dormant: on the other hand, when one of the contending parties so far forgets himself as to adopt a tone of coarse personality, or like "Spectator," openly to throw out insinuations in plain language, that one plan has actually been "*stolen*" from another, he at once forfeits all claim to the privileges of an anonymous correspondent, while his remarks lose all title to public confidence and consideration.

For this reason, I should certainly have been led to pass over in silence "Spectator's" reflections on myself, or rather on the actions for which I hold myself responsible, couched as they are in an effusion not remarkable for its veracity, and deficient in that tone and good taste which one is bound to expect from the pen of a gentleman, were it not that I am anxious to efface from the minds of any of your readers any false impressions which are calculated to deter them from the partial or general use of an invention which I have freely and unreservedly offered for the benefit of our seafaring community at large, and for the future success of which I claim no more solid reward than the self-gratification of having proved useful in the cause in which I have long laboured.

In the first place, I will proceed to give my most positive and unqualified denial to the assertion that in the construction of my plan, I have been indebted either ideally or substantially to Mr. Clifford's apparatus for the same purpose. I admit that I have studied the latter most minutely, and I conceive it to be no more than the bounden duty of every officer to make himself thoroughly acquainted with details which already form a prominent part of our naval economy, their proper use involving no less an issue than one of life or death. Had I neglected the study, I could hardly have ventured to publish criticisms on the plan itself, and I will not plead so far guilty to the charge of inconsistency, as of having borrowed from an invention of which I have thought proper publicly to disapprove.

"Fairplay" is correct when he states, that, in common with certain boat experimenters whom he names, (I might say all) I also have called into requisition one of the numerous applications of the "roller;" at the same time, it is evident to every unprejudiced observer that the "slip capstan" which I have introduced into my apparatus has no more resemblance to Mr. Clifford's "winding real" or "plain roller," than it may be said to bear to the rude cylinder which was engraved on the tombstone, and supplied the missing clue to the last resting place, of the great Archimedes himself.

There is, however, I readily admit, another description of roller applied to a totally different purpose, to which my contrivance does indeed bear a strong resemblance, and from which, I have never even made it a secret, I certainly did derive some useful hints. The same roller I believe to be of French extraction, and was at one time, and

may still continue to be, much used in the French navy, for securing and letting go their heavy anchors. In our service, for obvious reasons, it is not approved of; in fact, as far as my own observation goes, it is confined to one solitary instance, and, strange to say, that solitary instance happens to be under the very nose of those persons to whose idle, not to say mischievous tittle tattle, it appears that I am indebted for those dark inuendos which, according to "Spectator's" first effusion, seem to have carried so much weight into them as to render his interference necessary. Here I must do one or two of the leading "civil functionaries" of the dockyard alluded to the justice to state, to judge from my own experience, that their zeal and devotion to Mr. Clifford's cause have been as remarkable as their mode of urging it seems to have been unscrupulous.

In fact, the whole length and breadth of this weighty matter is contained in a nutshell, and it will appear by my own acknowledgment that I have committed the grievous sin of transferring the ground plan of a contrivance, disapproved of in its original position, and therefore useless to any one, and of laying it as the foundation-stone of another, which I have every reason, as a professional man, to assume may prove of public benefit, and which so far promises success as to have already occasioned some alarm to Mr. Clifford's supporters, and is reported to have gained for me honours which I was not aware I possessed. At all events, with what I have done no one has right cause to complain. On the contrary, if I may be permitted to quote as a truism the pith of a letter which appears in your number for August 8 (page 133), I have even done the state, or at least the mechanical branch of it, some service.

This letter contains such sound common sense, with such good advice to mechanical aspirants in general, that I will request your aid to republish it with the foregoing: "It seems increasingly true that 'there is nothing new under the sun;' and if men of talent, and especially men of genius, would content themselves with utilizing the detached data developed by ages, instead of contending for priority of invention—a thing that seldom holds water—they would sooner arrive at excellency and great usefulness, and avoid much mortification."

I am, Gentlemen, yours, &c.,

W. E. Kynaston.

Cauford, Aug. 24, 1857.

To the Editors of the Mechanics' Magazine.

Gentlemen, — Absence from town has prevented my replying so early as I otherwise should have done to my friend "Spectator's" letter in your Magazine of the 22nd instant.

I am sure he will excuse my suggesting his bearing for the future another designation. Either "Rambler" or "Tatler," would be very much more appropriate. Why should he, if he had any doubt as to the necessity of answering my last, have taken the trouble to indite and publish a vulgar production, in which, for want of argument, he is obliged to have recourse to the never failing alternative, personal abuse?

I invite your readers to peruse the whole correspondence which has appeared in your Magazine on this subject, and then to pronounce between us whose letters contain most indications of "mean-mindedness" in the writer; most "suspicions, reflections, and imputations;" which betray most absence of the "higher virtues;" and which show most knowledge of the subject on which they are written. "Spectator" cannot even quote fairly; my letter contains no such nonsense as "Archimedes' antithesis,*" the humming-top and the cross-bow."

When "Spectator" says he understands his subject, he will pardon me for saying that (judging only from his letters), I do not believe him. I trust my letter was intelligible to those less dull of apprehension than himself; and as regards a knowledge of patent law, without arrogating to myself any very remarkable degree of it, I am certainly not disposed to admit "Spectator's" superiority in that respect.

I have never attacked Mr. Clifford, but I do not think it necessary to disavow a knowledge of Captain Kynaston. On the contrary, I am proud of his friendship. He is an officer who not only gained honours in the late war, but received a wound which, resulting in a dangerous disease, has incapacitated him from serving his country further in his profession, to which he is most attached. As early as 1849, he published a treatise embracing every point connected with saving life at sea; and, amongst other plans, one, the first of the kind, for disengaging ships' boats at sea. These ideas were freely given to the public generally; and when he had matured his present invention, he at once offered it gratuitously to the Royal (and is about to do so to the merchant) Navy. It was tried in Plymouth Sound before distinguished naval authorities, in spite of every species of obstruction offered by the misnamed "civil" functionaries of the Dockyard at Devonport, and succeeded perfectly. He subsequently published a pamphlet embracing the objections to which, as it appeared to him, Mr. Clifford's invention was open; and this, and his own plan, in its turn, were open to all fair comment, but your review of it did not call for "Spectator's" unwarranted attack.

Mr. Clifford is not a naval officer, but a news agent, and his invention, containing, as it does, so much that is excellent, does him only higher credit in consequence. It is right he should have this credit, because in many quarters he has been supposed to be himself a naval man, or attached to a family of high naval rank and precedence of the same name; while in others, his address in the Temple has led to the impression that the profession of the law had the honour of claiming him for a member.

I am almost ashamed to ask you to insert any more letters on this subject; but I can certainly pledge myself that this is the last with which I shall trouble you as long as "Spectator" constitutes himself Mr. Clifford's champion.

I am, Gentlemen, yours, &c.,

Fair Play.

London, Aug. 31, 1857.

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* In "Spectator's" manuscript this was "Archimedes, antitheses," &c., and should have been printed so.—Eds. M. M.

SCIENTIFIC FANATICS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—If the letter of "Theorist," headed as above in your last number, be not designed to reflect upon me to some extent, I cannot discover its origin. Its object is avowedly to caution the public "against branding as fanatics those who by their inventive genius are destined to confer upon the world great social and commercial benefits." But why connect such a caution with my paper? Those gentlemen who honoured that paper with their perusal, will remember that I branded no one as a fanatic in his scientific bias, who could not be *demonstrated* one; and I believe that this is amply sufficient to distinguish my branding from the branding of those creatures of all ages who have persecuted men of science for rejecting *hypotheses.* "Theorist" will, I hope, observe the importance of the distinction.

I know as well as "Theorist" that good and able men have been persecuted as fanatics, when they were perfectly right, and I know that the fact is to be lamented. But this shall not hinder me from pronouncing a true fanatic to be a fanatic. "We ought," says "Theorist," "to be careful ere we affix the brand." I rejoin—I was careful.

I think the proposition of "Theorist" respecting the twenty madmen and the one man of genius a very questionable one. It may be for the world's advantage that a man of genius should suffer shame, but I do not think any good could result from twenty madmen winning our reverence.

I am, Gentlemen, yours, &c.,

The Editor of the Meteor of Science.*

August 24, 1857.

ASTRONOMICAL OBSERVATIONS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Your correspondent "Mechanicus" will find the oscillation of a simple pendulum discussed, in a manner which will answer his purpose, by Legendre, in his *Traité des Fonctions Elliptiques,* vol. i., page 41. In asking to be supplied with the graduation which he wants, he seems to have overlooked the fact that there are three elements in the calculation which he requires, and that two of these must be arbitrarily determined before the lengths for graduation can be tabulated:

1. The length of the pendulum.
2. The amplitude of its complete vibration, or the velocity at the lowest point.

* The above letter will be found to contain a reply to the letters of "Not a Fanatic" and one or two other correspondents who have written respecting the "Few Fanatics."—Eds. M. M.

The third element, which may be the tabular variable, or the argument of the table, may be the time or the length.

The elliptic function, on which the calculation depends, is tabulated in the second volume of the work which I have quoted. A small correction would of course be required for a compound pendulum vibrating in air.

I am, Gentlemen, yours, &c.,

C. W. Merrifield.

6, Brompton-grove, S.W.,
Sept. 1, 1857.

TIMBER-BORING MACHINE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I beg leave to return you my sincere thanks for your last week's Magazine with the report of my timber-boring machine, which, upon the whole, was a pretty fair description of its merits. As the communication was referred to the committee of the Royal Scottish Society of Arts, I have not hitherto considered it requisite to pay the least attention to Mr. Sang's silly remarks; but seeing that they have gone the round of the press, perhaps you will favour me by allowing a word or two of explanation to meet his, "tending to show that more time would be lost in adjusting such a machine to treenail holes in ships than boring by the usual method; and that such a machine would require to be stationary, and the work brought to it, in place of it being moved to the work." "He gave as an instance Mr. Fairbairn's rivetting machine, a most useful one; but then the boiler to be rivetted was swung in such a manner as that any part to be rivetted could be brought exactly opposite to the rivetting machine. This could not be done with a ship on the stocks."

In my communication to the Royal Scottish Society of Arts, after explaining the principle upon which the machine wrought, I stated, "In this position the fly-wheel (and engine) may be *placed stationary* on any convenient place or stage, while the small wheel and auger attached may be shifted '*exactly opposite to the place wanted to be*' *bored* within a radius of 20 feet distance from where the engine is at work. It even may be slung over the side of a ship, and supported and shifted; the small wheel is wrought with a strap intervening between it and the fly-wheel."

Notwithstanding all this, it appears that although Mr. Sang can well understand how a "boiler" is swung, raised, or lowered, shifted backward and forward, and steadied before the "rivetting machine" while performing the operation; yet how to sling, shift, and support a small wheel and auger over a ship's side,

although scarcely of as many ounces weight as his "boiler" is of cwts., Mr. Sang cannot conceive; nay, he would sooner attempt to swing a "ship off the stocks," as he says, than attempt doing so with the boring machine, a few pounds weight.

But the intrinsic value of the timber-boring machine is that it can be made to bore in any direction; and while the *engine is stationary*, the small wheel and auger can be swung over the side of the ship, and directed to bore treenail holes at *any point* within a radius of 20 feet from where the engine is at work, and bore more timber than fifty carpenters can execute upon the laborious existing method.

I am, Gentlemen, yours, &c.,
DONALD ROSS.

Helmsdale, August 19, 1857.

REFLECTORS FOR GAS-LIGHT.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Although a constant reader of your excellent publication, I overlooked your notice on the above subject until seeing Messrs. Pettit's letter inserted this day; this will account for my delay in making the remarks I now beg to offer.

For the *new improvement* mentioned as being Mr. Jobin's, I took out a patent as far back as two years ago, under the name of "Improvements in Reflectors called Argento-Crystal," which I am happy to say are now generally adopted.

A brief explanation of my process of manufacture will suffice:

1. I produce a silver-plated highly polished surface, the shape and concavity of which are in strict accordance with the scientific rules of refraction.

2. A glass of the finest flint is moulded to the form of the metal reflector, and made to undergo a special annealing operation.

3. Both glass and metal are joined by means of a metal rim and a peculiar mode of soldering.

Now, I have no wish to detract from the well-known merits of the prismatic glass reflector, but I think the advantages of my argento-crystal are self-evident. Whether for reflecting or refracting light forward or downward, they are infinitely more powerful; no light being allowed to escape reflection, as with the clear glasses, however thick they may be. Then my surfaces are such as to answer for concentrating the light or for diffusing it, the crystals being either plain or corrugated, as may be required. A permanent brilliancy is insured, the reflector being made air-tight; thus this patent obviates the objection to the plain metal plated, which tarnishes. And, lastly, if any accident occur, I can easily, and at a cheap cost, insert a new glass: whereas, with the prismatic glasses, or even the silvered glass reflector, the original outlay is entirely lost.

I have said nothing of the saving my reflectors effect in the consumption of gas, because it follows as a matter of course; but I will only add, that an inspection of my patents will at once prove the validity of my assertions.

Trusting to your well known impartiality to insert the above,

I remain, Gentlemen, yours, &c.,
P. E. CHAPPUIS.

69, Fleet-street, Aug. 22, 1857.

MR. PRATER ON SOUND.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—From the *off*-hand way in which your correspondent, "Mr. F. H. H.," speaks of my humble attempt to clear up some of the difficulties respecting sound, one might imagine that he had really found out, *by experiment*, that the vibrations of *air* could pass through a dense brick wall, &c., &c.; and as he asks why I do not make experiments, I may also, with more reason, ask why *he* does not, before he attempts to upset any new theory, or "*revived*" theory, if he prefer so to call it; though as I do not know on what grounds Lamarck talked about the "matter" of sound, I claim for myself a certain share of original thought, at all events, on this subject. I may inform him, that *I have* made a vast number of experiments on other points, but not having had leisure to do so on this point, I conceived the next duty to science was to suggest a few to other persons who might have the particular apparatus, of the VERY BEST DESCRIPTION, required for such, at their immediate disposal. If, therefore, he be not capable of doing so himself (and a man might have written the note he did without even knowing the *very rudiments* of chemistry or physiology), let him not try to prevent others who may have more talent for science doing it; for *attempt* at wit (or even wit itself) is a very different quality from a talent for philosophy. I think I am justified in saying his note is but an *attempt* at wit, for he begins by assuming that "covered" and "under a cloud" mean the same thing, and then easily goes on to *misstate* facts,* and talks about this cloud, whereas I talked about a wall, or other solid substances. And if, as he says, it is my misfortune to have my head more like the

* See *his* inference put down as mine at the beginning of his letter; and my conjectures about the ether stated as if I inferred it as an *ascertained* fact, whereas (in my essay) I only put it as a query, open to future experiment.

latter, I can beg to assure him it is his to have a head like the former, too soft, instead of too hard, as he seems almost himself to be aware by his *dreaming* about clouds, rather than in a scientific journal endeavouring to upset reasoning by reasoning, or experiments (even of others) by new experiments. *Has* he ever made one? If not, let him begin; for certainly wit is not his province, and while Swift and Molière live no men of sense would dream of reading *him*.

If inclined, even I (though I do not profess to have been favoured by Nature with the witty vein) could easily turn many scientific inquiries into ridicule; such, for instance, as the examination of the fæces, &c., &c., now going on (with great credit to the experimentalists); but I should certainly decline to do so, for, on the contrary, I hold these are the very men who most deserve pensions from a Government, as they take up a branch of science nobody else will.

If your correspondent had only adduced one single *fact* in favour of his view, I should not have felt myself called upon to denounce so plainly his ludicrous, but at the same time half-impertinent abortion.

I am, Gentlemen, yours, &c.,

H. Prater.

SCIENTIFIC QUESTIONS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Your correspondent "A Reader," feels the want, as doubtless many do, of a scientific "Notes and Queries" periodical. How often will the self-taught man take up some work on science, and after robbing himself for nights of his necessary repose, be forced to fling it by in disgust, when one or two questions properly answered would set him right. It is true he may send them to some first-class journal, but he will be consoled with, "Not suitable for insertion," "Too trivial," &c. Trivial they may be to the Editor, not so to him.

Please let "A Reader" know that to soften steel, he must heat it to redness, and then hold it in the shade till it becomes black; it is then to be cooled in water. This plan also removes pins that occur in filing iron. As to the amount of metal in vermilion, 1 lb. will contain about 13·6 ounces; and in general the weight of any ingredient in a given compound is proportional to its atomic weight.

W. Carroll, *Blacksmith.*

Openshaw, Manchester.

MISCELLANEOUS INTELLIGENCE.

The "Candia."—We some time ago noticed the lengthening of the Peninsular Company's vessel the *Candia* (about 35 feet amidships), by Mr. Laird, at his new works, Birkenhead; and, as the alteration added greatly to the ship's carrying capacity, while the engines and boilers were not increased in size, the following tabular statement of the result in smooth water will be interesting, as all parties agree that in bad weather she will, with the additional length of floor, be a much faster vessel than before :—

	May 31, 1855.*	Aug. 8, 1857.†	Aug. 12, 1857.‡
Draught forward	18ft. 6in.	18ft. 2in.	18ft. 2½in.
Ditto aft	18ft. 6in.	19ft. 5in.	19ft. 7in.
Ditto mean	18ft. 6in.	18ft. 9½in.	18ft. 11in.
Area mid. sect ..	536 feet.	551 feet.	556 feet.
Displacement ...	2,435 tons.	3,086 tons.	3,069 tons.
Nominal h. p....	450	450	450
Ind. h. p.	1,415	1,250	about 1,400
Revolutions ...	34½ to 37	31	33
Pressure	22lb.	16lb.	20lb.
Vacuum	26½	26	26½
Speed	12,651	11,675	12,443
Pitch of screw.	20 feet.	21 feet.	21 feet.
Diameter of do.	15ft. 6in.	15ft. 6in.	15ft. 6in.
Blades	2	3	3

* Trial before being lengthened.
† First trial after being lengthened.
‡ Second trial after being lengthened.

The London Central Railway Station.—The Marquis of Westminster, it is stated, has leased the Grosvenor Canal and the large Pimlico Basin to the railway companies south of the Thames for a branch line and central station for all London. We suppose the information may be relied upon, but an obscure corner of Pimlico would assuredly not have seemed to us a likely place for a central station. By actual measurement, the Grosvenor Basin is further from St. Paul's than any existing railway station, north or south of the Thames, except Paddington. Even from Charing-cross, it is further than Waterloo station, and almost as far as London Bridge. A certain convenience for the West End will doubtless be gained by a railway station in Pimlico,—but to erect there a *central* station for all London would be a curious bit of commercial farce.—*Athenæum.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Dethier, T. *An improved knife-cleaner.* Dated Dec. 22, 1856. (No. 3020.)

This consists in placing the knives in the frame so as to present their points (which generally require most cleaning) to the more rapid action of the rubbers or pads, and is effected by placing the knives radiat-

ing from the centre of the apparatus (which the patentee makes of a circular form) with the points or ends towards the circumference and the handles towards the centre, by which arrangement he causes the largest portion of the rubbers or pads to pass over the points or ends of the knife blades.

GIBSON, R. *An improved self-acting apparatus for signalling on railways.* Dated Dec. 22, 1856. (No. 3021.)

This consists of self-acting apparatus actuated by the passage of the locomotive engine, and reacting upon similar apparatuses placed at any required distance from each other, causing those also to give audible or visible signals.

MILL, W. *Improvements in joining bands, in connecting fastenings to bands, and in attaching bands to articles requiring the same.* Dated Dec. 22, 1856. (No. 3022.)

These improvements cannot be described without engravings.

PAYNE, W. J. *Certain improvements in casting and finishing cocks for general purposes.* Dated Dec. 22, 1856. (No. 3023.)

This consists in lining the barrels and coating the plugs of cocks or taps with molten zinc, or other molten metal of sufficient fluidity in its molten state, and sufficient hardness and lubricity when set to resist abrasion when the cocks or taps are in use.

THURLOW, T. L. *Improvements in reaping machines.* Dated Dec. 22, 1856. (No. 3028.)

Here a fore and hind axle are employed. Each axle has two wheels, and the fore wheels are of larger diameter than the hinder ones. The axles are arranged to admit of the distance of the wheels apart being varied. The cutting apparatus is combined with the fore part of the carriage, and provision is made for adjusting the height of the cutting apparatus above the land.

STRATTON, W. H. *Improvements in the fire doors of furnaces.* Dated Dec. 22, 1856. (No. 3029.)

Here there are a series of parallel iron plates fixed to, but at a short distance from, each other, and from the interior of the fire door. These plates are perforated with numerous holes, the metal bent out of such holes being left connected to the plate and caused to project inwards, so as to offer inclined heated surfaces against which the incoming currents of air impinge as they pass through the plates, and, as the holes in the several plates are arranged in different lines, a stream of air passing through one will be deflected off before it comes to an opening in the next.

REDGATE, J., E. ELLIS, and J. CROPPER. *Improvements in bobbin net or twist lace machinery.* Dated Dec. 22, 1856. (No. 3030.)

This invention cannot be described without engravings.

JOHNSON, W. B. *Improvements in steam engines and apparatus connected therewith.* Dated Dec. 22, 1856. (No. 3034.)

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SMITH, W. *Certain improvements in railway rolling stock.* (A communication.) Dated Dec. 22, 1856. (No. 3035.)

By the present invention a series of trucks are each fitted with steam-engine cylinders by the action of the steam in which motion is communicated to the wheels of such trucks or carriages; and the steam necessary for communicating the power may be conveyed from the boiler of a locomotive traction engine in the front of the train by means of steam pipes.

PRINCE, F. *Improvements in fire-arms.* Dated Dec. 22, 1856. (No. 3036.)

This consists in producing more positive expansion in the plug described in a previous patent of the 21st day of February, 1855, No. 386, for breech loading fire-arms, by means of concaving the same, and fitting therein a steel or other plunger.

BAILEY, J. S. *Improvements in machinery for combing wool and other fibrous materials.* Dated Dec. 23, 1856. (No. 3037.)

This invention relates to various arrangements of machinery which cannot be clearly described without engravings.

SPENCE, W. *Improvements in the manufacture of felt.* (A communication.) Dated Dec. 23, 1856. (No. 3038.)

This consists in applying to the manufacture of felt some of the downy portions of aquatic plants, consisting of grasses, such as feather grass and cotton grass, reeds, &c.

DICK, J. R. *Improvements in window sashes.* Dated Dec. 23, 1856. (No. 3039.)

This consists in the sides or outer portions of the sash frames being formed in two parts, and bolted together so as to slide within the window frame attached to the cords and weights in the ordinary manner, and to admit of the sash being easily separated when required, and lowered into the room without removal from the frame.

NEWTON, W. E. *Certain improvements in meters for water and other liquids.* (A communication.) Dated Dec. 23, 1856. (No. 3041.)

The object here is to enable measured water to be supplied in a more constant and uniform stream than it is by any of the flexible diaphragm meters heretofore employed.

LARK, J. *Improvements in kilns for burning materials in the manufacture of lime and cements.* Dated Dec. 23, 1856. (No. 3044.)

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MacDonald, D. *Improvements in washing, bleaching, cleansing, and preparing textile fabrics and materials.* Dated Dec. 26, 1856. (No. 3062.)

This consists in washing and bleaching textile fabrics and materials by the combined agency of steam, chemical matters, and mechanical action. The working vessel resembles an inverted boat with its two ends cut square off, and it fits closely in between the two opposite flat sides of a stationary chamber, and with its bottom edges in close contact with the concave bottom surface of that chamber. A horizontal spindle serves as the working centre of the working vessel, so that as the working vessel is moved from side to side it follows the curve of the stationary chamber's bottom.

MARCESCHEAU, A. J. B. L. DE. *Improvements in the mode of communicating or transmitting motion to propelling apparatus, engines or machinery.* Dated Dec. 26, 1856. (No. 3064.)

This mainly consists in the employment of series of vertical floats attached to horizontal bars, or frames, worked by cranks.

IRLAM, W. *Improvements in the construction of railway turn-tables and weighing cranes.* Dated Dec. 26, 1856. (No. 3065.)

This consists—1. In making the outer curb or guard of railway turntables of wrought-iron plates. 2. In rivetting chairs to such curb or guard to support the annular rail for the turn-table to revolve upon; or in attaching the rail to the curb or guard by other means. 3. In making the platform or revolving part of the turntable of an outer ring connected by wrought-iron girders which support the chairs for the cross rails. 4. The improvements in weighing cranes consist in placing the fulcrum of the weighing beam or lever at the end thereof, and causing the chain supporting the load to pass over a guide pulley near the fulcrum end of the weighing beam or lever, the other end of which is connected to a weighing apparatus.

CAMPIN, F. *The manufacture of a certain textile fabric, which the inventor terms "tissu buffle."* (A communication). Dated Dec. 26, 1856. (No. 3067.)

This tissue is composed of either cotton, thread, flax, hemp, silk, or any other textile substance. The loom for making it is the same as the jacquard, saving some alterations. It is mounted with cording or tying mechanism on Jacquard's system, 24 needles, 24 hooks, and 12 lifting pieces of cork.

GOODMAN, H. H. *Improvements in the construction of locks.* (A communication.) Dated Dec. 26, 1856. (No. 3070.)

This consists in so arranging and combining a series of revolving slotter discs mounted upon a stationary neck or stud that the slots of each shall be severally set by each other in turn, when properly operated upon by a fixed disc mounted upon a revolving shaft, so that the rear end of the lock bolt shall be free to enter the slots to permit the door to be unlocked, there being but one revolving graduated index necessary to adjust the whole, and that secured to the revolving shaft.

CLARK, W. *Improvements in air and water-proof coatings, and in their applications.* (A communication.) Dated Dec. 26, 1856. (No. 3074.)

This relates to coatings to be employed particularly in dyeing and painting, in the preservation of moulded plasters, porous stones, and organic pervious alterable substances. It is a kind of artificial leather composed of gelatine and tannin. The patentee imprints or coats the objects to be treated with gelatine, isinglass, or glue, and after drying soaks them in a solution of tannin, or of matters containing tannic acid, such as nutgall, sumach, boblah, or oak bark.

COX, R. R. *Improvements in the manufacture of artificial fuel, and in machinery for that purpose.* Dated Dec. 27, 1856. (No. 3075.)

The patentee mixes small coal with cow dung, moist clay, and coal tar; or, in lieu of the small coal only, he employs coal and spent tan. The moist clay and cow dung bind the coal and tan together, and the small quantity of tar increases the flame in the combustion of the fuel.

SHAW, T. *Improvements in furnaces or fire-places.* Dated Dec. 27, 1856. (No. 3078.)

This relates to a novel mode of actuating the grate bars of furnaces or fire-places for preventing clinkers from adhering thereto or between the bars. The fire-bars are supported at each end by rocking arms or levers, arranged in pairs, and mounted upon two common rocking shafts connected by a rod.

PETRIE, J., and W. MCNAUGHT. *Improvements in steam engines.* Dated Dec. 27, 1856. (No. 3079.)

This consists—1. In certain apparatus for causing cams to revolve round their axes for altering the time for cutting off the steam. 2. In a method of constructing the packing ring of piston valves in one part connected with a boss or snug for receiving the valve rod, the ring above mentioned being forced out by suitable wedges or other such apparatus. Another part of the invention relates to oiling the pistons and cylinders.

LORD, T. W. *An improved mode of drying flax, tow, hemp, silk, cotton, and other yarn, in the process of dressing, warping, sizeing, beaming, and preparing yarn for weaving.* Dated Dec. 27, 1856. (No. 3080.)

This consists in placing between the sizeing trough and the winding-in frame of a dressing and warping machine, and below the yarn, an apparatus for heating air by steam, formed preferably as a rectangular steam chest traversed by a number of air tubes open at each end, whilst a box connected with an exhausting fan is placed above the heater or steam chest.

SWAIN, W. *Improvements in heating and ventilating.* Dated Dec. 27, 1856. (No. 3081.)

Claims.—1. Heating and ventilating rooms and buildings by means of a tubular chamber situated at the back of a grate or stove, the heated air and products of combustion from the fire being made to pass through tubes in the said chamber, and the air delivered into the room from the external atmosphere being heated by contact with the exterior of the said tubes. 2. Withdrawing the warm and vitiated air of the upper part of the room, and delivering it through perforations at the back of the grate, so as to promote combustion and prevent the formation of smoke. 3. The construction of detached tubular chambers to be used with grates and stoves of the ordinary construction as described. 4. A method of heating hothouses and conservatories, and charging the heated air supplied to the same with the vapour of water. 5. A method of constructing hot-air chambers. 6. A method of ventilating kilns and hot-air stoves.

RITCHIE, G. *Improvements in the manufacture of beds and mattresses.* Dated Dec. 27, 1856. (No. 3082.)

In making a case (suitable to be stuffed with ground cork to form a bed or mattress) the upper and under fabrics are connected at intervals by partitions of fabric of a width about equal to the thickness of the bed or mattress, and intermediate of these partitions tying straps are attached. One side is then sewn to the ends, the several compartments are filled with ground cork, and the other side is then sewed to the two fabrics and to the ends of the partitions.

WAGSTAFF, J. C. *Improvements in the manufacture of felted cloth.* (Partly a communication.) Dated Dec. 27, 1856. (No. 3083.)

This consists in a method of accumulating a series of layers of a bat or fleece, and the object is to cross the layers that the cloth made therefrom shall be equally strong in every direction. The bat or fleece is wound on a drum of greater length and circumference than the length and width of the piece of cloth which it is desired to make. This drum is supported by a carriage which runs backwards and forwards on a railway in the direction of the axis of the drum. Thus, by the combined motions of the drum, the bat or fleece is wound thereon so as to cross the fibres.

ATKIN, T., and M. MILLER. *Improvements in folding lace, paper, and other fabrics.* Dated Dec. 27, 1856. (No. 3084.)

This cannot be described without engravings. Claims—1. The use of a traversing stage. 2. The use of a folding or carding board having two or more troughs or grooves. 3. The dropping of pins or wires by machinery in folding.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

NEWBURY, T. *Improved machinery for making screws.* Dated Dec. 22, 1856. (No. 3018.)

This consists in a new combination of devices for feeding, pointing, and threading screw blanks.

WILKINSON, C. C. *An improvement in carving forks.* Dated Dec. 20, 1856. (No. 3019.)

This consists in applying to the stems of forks, and in recesses or slots formed therein, sharpening discs or plates intersecting each other, so as to form suitable angles between them to receive the edges of carving or other knives.

SAMPSON, F. *Improvements in apparatus employed for singeing fabrics.* Dated Dec. 22, 1856. (No. 3024.)

The principal method of singeing fabrics is by raising them to pass over a plate heated by an enclosed fire in a furnace placed beneath such plate, and the improvements consist in means by which more efficiently to impart the heat from such furnace to the plate, and is effected by forming an arch just within such singe plate, with an opening along the centre thereof through which the fire and heated particles pass to the plate, and thence by the passages between the arch and singe plate to suitable flues.

LANG, L. A. *A new system of rotatory motion for all kinds of vehicles.* Dated Dec. 22, 1856. (No. 3025.)

Instead of supporting the body of the vehicle upon the axle, or in the centre of the wheel, as is generally done, the inventor causes it to rest upon an exterior part of the nave of the wheel, between the spokes and the frame or body of the vehicle.

THORNTON, E. *Improvements in furnaces.* Dated Dec. 22, 1856. (No. 3026.)

This consists in placing a set of short fire bars or gratings slanting downwards from the dead plate, or dipping at an angle of about 40° or 45° towards the ashpit, where the ends rest upon a suitable bearer.

The inventor places the ordinary bars at an incline in the contrary direction from this bearer to about the level of the dead plate at the other ends, thus forming a recess for the fire bed which enables the user to have a strong body of fire in front of the furnace. A better draught is thus obtained, also a better combustion of the fuel, and the smoke nuisance is abolished.

ROBERTS, T., J. DALE, and J. D. PRITCHARD. *Improvements in the manufacture of oxalate of soda, which improvements are also applicable to the manufacture of oxalic acid.* Dated Dec. 22, 1856. (No. 3031.)

This consists in producing oxalates of soda, &c., by subjecting the substances employed in such manufacture to the action of alkaline salts, with or without caustic alkalies at a high temperature.

DAVIS, G. *An improved name and business plate for the outside of doors and windows.* Dated Dec. 22, 1856. (No. 3032.)

This consists in using thin metallic surfaces of about one-sixth of the ordinary thickness, and causing the letters to be printed by the usual methods, and then varnished and glazed.

STANFORD, E. *An improvement in the manufacture of envelopes.* Dated Dec. 22, 1856. (No. 3033.)

This invention was described at page 5 of No. 1769.

NEWTON, W. E. *An improved mode of manufacturing capsules for containing medicines.* (A communication.) Dated Dec. 23, 1856. (No. 3040.)

A number of cores are first cast of some material, such as stearine, spermaceti wax, &c. These fusible cores are afterwards immersed in the gelatine in a liquid state. By this means the cores will be covered with a film of gelatine of the desired thickness, and, when dry, heat is applied to melt out the fusible cores, thus leaving the capsules empty and ready for use.

ANDERSON, J. *Improved means of protecting floating batteries, ships, land batteries, martello towers, or other constructions, against shot or shell or other projectiles.* Dated Dec. 23, 1856. (No. 3042.)

This consists in covering or protecting the exposed side of such constructions by means of plates or sheets of iron arranged above or over each other, so as to offer the several separate thicknesses of metal to resist the concussion of any projectiles.

ECROYD, W. F., J. HEYWORTH, and G. SCARR. *Improvements in looms for weaving.* Dated Dec. 23, 1856. (No. 3043.)

This relates—1. To the taking up motion. The inventors use a rod over which the cloth passes in contact with the cloth beam, and upon which there are two levers, one forming the holding catch for the ratchet wheel hereafter mentioned, the other being formed L-shaped, and carrying at one end a vertical lever on which is mounted the actuating click. This click acts upon a ratchet wheel, the projections being on the face and arranged in a radiating direction, so that when the vertical lever receives motion from the lathe sword, the catch acting upon the ratchet wheel gives motion by a train of wheels to the cloth beam, the variable motion of the catch being produced by the rod in contact with the increasing diameter of the cloth beam. 2. To the apparatus of looms for producing stripes or plain edging lists upon twilled fabrics, and consists in an arrangement of heddles whereby the wear and tear is reduced. The inventors mount the heddles for making the shed of the plain or the striped part of the fabric by straps upon friction rollers, the motion of the shed being obtained from the upper and lower edges of one of the ordinary heddles in a direct vertical line.

BAILLY, J. L. G. *Improvements in winding up or maintaining the power of clocks.* Dated Dec. 23, 1856. (No. 3045.)

The inventor maintains the action of a clock by means of a windmill or vane exposed to the action of the wind.

ROSS, A., J. VALENTINE, A. MURRAY, and A. DON. *Certain improvements in the purification of coal-gas, the residuum of such purifying process being applicable either as a manure or for manufacturing gas from.* Dated Dec. 23, 1856. (No. 3046.)

The inventors use hard wood, either in a state of sawdust or in a chopped condition, in lieu of the matters hitherto employed, the ordinary purifying apparatus being used. Upon the gas coming into contact with the wood chemical action ensues, and effects the purification of the gas, and the wood is converted into a manure, or it may be employed in the retorts in lieu of coal in the ordinary process of manufacturing coal gas.

DEHAYNIN, F. *Improvements in machinery for moulding and pressing artificial fuel and plastic substances, and for driving the same from the moulds.* Dated Dec. 23, 1856. (No. 3047.)

This consists of a pair of wheels set vertically with recesses which form the moulds on the periphery of one wheel, and with projections which act as pistons upon the periphery of the other wheel. One wheel is free to slide to and fro in its bearings, to which pressure is applied in order to force the projections into the moulds by weighted levers.

ABBOTT, G. W. V. *An improvement in bank notes, which is also applicable to share certificates and other similar documents.* Dated Dec. 23, 1856. (No. 3048.)

The object here is to prevent forgery,

more particularly by photographs taken from notes, certificates, &c. It also consists in printing the notes, certificates, and other similar documents upon both sides instead of on one side only.

ELLIOTT, J. *Improved machinery for manufacturing rivets, bolts, spikes, and other similar articles.* Dated Dec. 24, 1856. (No. 3058.)

This relates to a plan of forming these and other small articles from rod or bar iron by rolling.

HOSTEIN, J., sen. *An improved mechanism for stopping railway trains.* Dated Dec. 26, 1856. (No. 3061.)

This mechanism cannot be described without engravings.

SMITH, W., and D. BETHUNE. *Consuming or preventing smoke in chimneys and furnaces.* Dated Dec. 26, 1856. (No. 3063.)

This consists in improvements in stoves or grates and their flues, and in doors of furnaces. The inventors prevent smoke from rising by the admission of air in certain parts of the flues, and doors, or near thereto.

NEWBURGH, S., and C. STEINHART. *Improvements in keys, and certain means for preventing the picking of locks.* (A communication.) Dated Dec. 26, 1856. (No. 3066.)

This consists in dividing keys into two parts, the loop or bow and a portion of the shaft or spindle being one part, and the remaining portion of the shaft and the bit being the other part; in uniting the parts by screws, springs, or other equivalent, and in fitting arms in the upper part of the shaft which arms, when the two portions of the key are separated, fly or spring out from the upper portion. The means for preventing the picking of locks consist in fixing inside the lock a portion of a key, or a stop which shuts out all access to the wards of the locks, which can only be removed by the possession of the counterpart thereto.

CLAY, J. *A new or improved portable printing or impressing instrument.* Dated Dec. 26, 1856. (No. 3068.)

This consists essentially of—1. An inking cylinder; 2. A printing apparatus; and, 3. A stop. The inking apparatus is a perforated metallic cylinder surrounded with cloth, on to which the ink is poured. The printing apparatus is a metallic cylinder, on one half of which is hard-soldered or cast a piece of metal, and in the other half of the cylinder parallel slits are made by cutting out portions of the metal, in which slits moveable letters slide and are held together by a screw.

McINTYRE, J. *A safety sounding apparatus or alarum for sailing ships and steam vessels.* Dated Dec. 26, 1856. (No. 3069.)

This consists in giving notice of the approach of sandbanks, rocks, reefs, &c., by means of rods which are let down through the ship's bottom, the openings being rendered water-tight by a small metal tube suitably packed. These rods project below the keel, and are jointed at their lower ends, to which jointed part is connected a wire which leads to an alarm apparatus in any desirable part of the ship.

MITCHELL, W. L. *Improvements in railway switches and signal apparatus.* Dated Dec. 26, 1856. (No. 3071.)

In constructing railway switch apparatus the two moveable tongues of the main line and siding or branch are connected together by a link or rod, and a projecting bolt or instrument on the locomotive engine comes, when it is desired to change the position of the tongues, and causes the switch apparatus to be acted on. The invention includes other contrivances.

HEPPELL, G. *An improved method of producing signals in railway trains by means of air.* Dated Dec. 26, 1856. (No. 3072.)

The inventor fixes within the carriages an air pump, which he uses by forcing air within a receiver. He proposes to work it by means of a suitable apparatus connecting it with the axle of the carriage when in motion, and so arranged as to be easily and quickly thrown into action and out of communication with a whistle or trumpet.

DEELEY, W. C. *Improvements in reducing copper ores.* (A communication.) Dated Dec. 26, 1856. (No. 3073.)

This consists in taking certain copper ores, crushing them, placing them in a vat, and, if they contain much chalk or lime, vinegar added to water is thrown upon and mixed with them. They are next saturated with muriatic acid and water, agitated and allowed to settle. The liquor is then run off into a vessel into which pieces of iron are introduced. The copper in the liquor passes from it on to the iron, and adheres thereto, forming a coating upon it. This coating is then shaken and scraped off from the iron. This invention is chiefly applicable to poor ores which will not return a profit if subjected to smelting by heat.

NEWTON, W. E. *Improvements in sewing machines.* (A communication.) Dated Dec. 27, 1856. (No. 3077.)

This consists in forming a new stitch which cannot be pulled out, each stitch being tied and knotted, by throwing a shuttle and thread through a loop formed from its own thread.

PROVISIONAL PROTECTIONS.

Dated June 19, 1857.

1710. Stanislas Tranquille Modeste Sorel, of Paris, civil engineer. New chemical compositions, producing either house paintings, cement, or plastic paste to be moulded.

Dated July 4, 1857.

1870. John Smith, of Bradford, York, machine-maker. Improvements in flour-dressing machines.

Dated August 7, 1857.

2128. Berthold Lowissöhn, of Fenchurch-street. An improvement in the manufacture of soap.

2130. John Robinson Scartliff, of Wolverhampton, whitesmith. Certain improvements in mathematical instruments.

Dated August 8, 1857.

2132. Thomas George Shaw, of Blackheath, merchant. Improvements in washing and wringing-machines.

2134. John Langford, manufacturer, and Joseph Wilder, pyrotechnic artist, of Birmingham. Improvements in signals and alarums.

Dated August 10, 1857.

2138. Thomas George Shaw, of Blackheath, merchant. Improvements in machinery for thrashing and separating wheat and other grain.

2140. John Roberts, jun., of Whitechapel-road. Improving the combustion of fuel, and preventing the escape of fuliginous smoke from shafts and flues.

2142. Antonie Tremeschin, of King-street, Snow-hill, compositor. Improvements in curling-tongs.

2144. Peter Augustin Godefroy, of King's Mead-cottages, New North-road, operative chemist. An improved method of desulphurizing mineral-matrix, for the extraction of auriferous, argentiferous, and other metals contained therein.

Dated August 11, 1857.

2146. Alexander Lang, engineer, of Kinniel Iron-works, Linlithgow. Improved machinery for feeding steam boilers.

2148. William Lyell Groundwater, of Greenwich, engineer, and Henry Prince, of the Grove, Southwark, ironfounder. Improvements in pumps.

Dated August 12, 1857.

2150. Thomas Hardcastle, of Bradshaw, near Bolton-le-Moors, printer. Improvements in machinery for washing textile fabrics.

2151. Robert Wagstaff, of Mottram-in-Longendale, Chester, blacksmith. Certain improvements in machinery or apparatus for digging land.

2153. William James Cantelo, of Southwark, gentleman. Improvements in the preservation of vegetable matters.

2154. William Alexander Clarke, of West Malvern, Worcester, hydropathist. Improvements in the construction of and mode of applying hot air and vapour baths.

Dated August 13, 1857.

2155. William Pratchitt and Samuel Horrocks, of Bolton-le-Moors, Lancaster, engineers. Improvements in apparatus to regulate the pressure of fluids, and to compensate for the expansion of steam and hot water pipes.

2156. Henry Collingridge, of Saint Aldate's-street, Oxford, grocer. Improvements in separating metallic substances from coffee, and in the apparatus employed for the purpose.

2157. Robert M'Adam, of Baldoon, Wigton, N. B., dairyman. Improved apparatus to be employed in making cheese, and in drawing off liquids.

2159. John Alleyne Bosworth, of Humberstone, Leicester, gentleman. Improvements in machinery for grinding and crushing clay and brick earth.

2160. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in sewing-needles. A communication.

2161. William Edward Newton, of Chancery-lane. Improved machinery for cutting files. A communication.

2162. James William Benson, of Ludgate-hill, watch-manufacturer. Improvements in the construction of bows or handles of watches, lockets, eye-glasses, and other articles requiring such appendages.

2163. Thomas Eade, of Ipswich. An improved breech-loading fire-arm, and projectile to be used therewith.

Dated August 14, 1857.

2164. John Parkinson, of the Victoria Works, Bury, Lancaster, engineer. Improvements in the construction of pressure and vacuum gauges.

2165. Paul Emile Laviron, of Paris, gentleman. Improvements in apparatus for curing smoky chimneys, and for increasing the draught in them.

2166. John Tickle, of Westbromwich, Stafford, engineer. Improvements in metallic pistons for steam and other cylinders.

2167. Charles Gumm, of Change-alley, Cornhill, ship-broker. Improvements in the construction of boats. A communication.

2168. Frederick Lipscombe, of the Strand, water-filter manufacturer. Improvements in the mode of diverting the London sewage from the River Thames, and in discharging it into the sea.

2169. Samuel Draper, of Lenton, near Nottingham. Improvements in the manufacture of handles and fastenings for doors of railway and other carriages.

Dated August 15, 1857.

2171. William Smith, of Manchester, soap-manufacturer. Improvements in making soap.

2175. William Stettinius Clark, of High Holborn. Improvements in hay and hop presses, the same being applicable to compressing other substances of a similar nature. A communication from P. C. Ingersoll and H. F. Dougherty, of New York.

2176. John Coope Haddan, of Cannon-row, Westminster, civil engineer. Improvements in the construction of railways, and of the carriages to be used therewith or thereon.

2177. John Buckley, of Carr-hill, Saddleworth, York, cotton-spinner, and Thomas Wrigley, of the same place, overlooker. Improvements in self-acting mules or machines for spinning and doubling.

2178. Hubert Pirotte, of Liége, Belgium, mechanist. Improvements in the construction of lathes for boring and turning.

Dated August 17, 1857.

2179. Archibald Smith, engineer, of Princes-street, Leicester-square. Improvements in machinery for, and in the method or methods of, making wire ropes.

2181. Richard Talbot, of Blackburn, overlooker, and Benjamin Croasdale, of Witton, near Blackburn, joiner. Improvements in looms.

2183. Richard Hoe, of Leadenhall-street, packing-case maker. Improvements in bullion-boxes, and in boxes used for carrying other valuable commodities.

2185. William Edward Newton, of Chancery-lane. Improvements in the valve arrangement of steam and other engines. A communication.

2187. Charles Reeves, of Birmingham, manufacturer. Improvements in the manufacture of knives.

Dated August 18, 1857.

2191. Charles Nightingale, of Wardour-street, Soho, bedding-manufacturer. Improvements in and applicable to machines for tearing or reducing rags and other fabrics.

2193. William Young, of Queen-street, City. Improvements in fire-places or stoves.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

2214. Amos Pierce Chamberlain, of Paris, gentleman. Improvements in machines for cutting corks and other substances. Dated August 20th, 1857.

2227. Henry Hodges, of New York, gunpowder-manufacturer. Improvements in the manufacture of gunpowder. Dated August 22nd, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," September* 1*st*, 1857.)

866. F. Jossa. Improvements in furnaces and ovens for the prevention of smoke, and for economy of fuel.

1117. B. A. Fournier. Preventing on railways those accidents that occur through one locomotive running into another.

1126. J. Sharples. Improvements in dyeing cotton and other fibrous substances or materials.

1135. G. Cavanna. Improvements in obtaining motive power.

1137. C. E. Osmont. Improvements in pen-holders.

1149. J. Richard. An improved agricultural machine for cleaning grains.

1155. A. P. Rochette. An improvement in currying leather.

1157. A. P. Rochette. Improvements in currying leather.

1163. J. Caddick, T. Hemmings, and D. Caddick. Improvements in puddling and balling-furnaces for heating and melting iron or steel.

1166. S. Tonks, J. Breeden, and W. Breeden. A new or improved gas-burner. A communication.

1168. E. W. Otway. Improved apparatus employed in descending and ascending pits or shafts, and raising minerals and other bodies therefrom.

1169. W. White. Improvements in making moulds or matrices employed in casting metals.

1181. P. Dekeyser. An apparatus for preventing horses slipping. A communication.

1186. A. Eddington. Improvements in machinery for ploughing, tilling, and draining land.

1206. A. A. Rével-Busquet. Certain improvements in artificial flowers.

1221. G. Powers. An improved scuttle for ships.

1222. T. F. Hale. An improved tap or cock.

1225. J. Collins. Improvements in furnaces and flues, and in kilns and drying-chambers.

1232. A. A. Blandy. An improved mode of moulding and casting the plates or bases of artificial teeth.

1240. A. J. Paterson. An improved method of constructing and propelling vessels.

1264. J. Herrero. An improved inking and stamping-machine.

1266. R. W. Sievier. An improvement in the mode of treating saccharine juices in the manufacture of sugar.

1275. G. K. Geyelin. Making oscillating spring laths for beds, couches, and other purposes.

1305. J. W. Schlesinger. Improvements in the backs and covers of account books and other books. A communication.

1330. P. A. de Fontainemoreau. An improved hydraulic motor. A communication.

1382. R. A. Brooman. Improvements in machinery to be employed in the refining of sugar. A communication.

1399. W. Clark. Improvements in the manufacture of silk, and in the machinery used therein. A communication.

1427. W. Clark. Improvements in the preparation of the colouring matter called murexide. A communication.

1493. R. Low and W. Press. A certain new improvement or new improvements in the construction of vices.

1686. J. Ellis. Improvements in apparatus to be used for decanting wine and other liquids, and for drawing corks from bottles.

1694. J. H. Whitehead. Improvements in pressing cloth.

1882. P. A. de Fontainemoreau. Certain improvements in apparatus for the manufacture of boots and shoes, which apparatus is also applicable for uniting other articles together. A communication.

1945. J. H. Whitehead. Improvements in milling endless cloths.

2126. T. Lawley. Improvements in ornamenting articles made of tin-plate and other bright metals.

2185. W. E. Newton. Improvements in the valve arrangement of steam and other engines. A communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1888. John Gray.
1892. John Stephen.
1927. James Parker.
1971. John Wesley Hackworth.
2043. James Egleson Anderson Gwynne.

LIST OF SEALED PATENTS.

Sealed August 28, 1857.

588. Charles Weightman Harrison.
599. Samuel Wright.
606. Thomas Rose, jun.
611. William Poupard.
612. Richard Archibald Brooman.
613. David Partridge.
614. William Brown.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

"Nauticus," B. Cheverton, and other writers on "Steam Ship Performance."—We thank you for your several contributions, and for all the good feeling expressed therein. We fully recognise the good faith and temper of our opponents; but we are quite unable to afford further space to the discussion of the subject at present. Our remarks of last week must be accepted as our decision upon the subject. We observe in the remarks of some of our friends indications of what we hold to be a want of proper preparation for the discussion of the matter, and we fear no disquisitions of ours will compensate for this defect. To thoroughly sound and experienced men of science we submit our investigations with perfect confidence.

The present influx of British Association Papers, &c., will leave but little space for the service of our correspondents for some few weeks.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

Errata.—The following corrections require to be made in our remarks upon the letter of "Nauticus" in our last Number:

Page 199, col. 1, line 4 from bottom, *for* "of the factor" *read* "and *f* the factor." Page 199, col. 2, line 17 from bottom, *for* "resistance" *read* "power." Page 201, last line of the article, *for* "quadruple" *read* "octuple."

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1779.] SATURDAY, SEPTEMBER 12, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

DRAKE'S BREECH-LOADING CANNON.

Fig. 1.

Fig. 2.

DRAKE'S BREECH-LOADING CANNON.

In another part of this Magazine appears a letter from Mr. John Poad Drake, detailing with considerable minuteness the relation which that gentleman (who is the originator of many hundreds of important inventions, apparently) sustains to this nation and to its Government. As the author has passed the term of middle life, and as the demands upon the national resources for war purposes are just now becoming enormous, he has resolved to bring to the public notice the narrative alluded to, in the hope that something effective may be done with his improvements. His resolution is, we think, both judicious and noble.

While thus affording Mr. Drake facility for apprising England of his inventions and his intentions, we must observe that there is one sentence in his letter which requires a word of comment from us. Mr. Drake, in his opening sentence, mentions having placed before us "400 practical drawings." Now it must not be supposed, from the insertion of this statement in our pages, that we thereby express an opinion in favour of the various designs and devices thus alluded to. This is not the case. We could not, of course, pretend to examine 400 inventions in a single interview, or indeed at all, under the circumstances; and we really think the mere invitation to examine them, except under most extraordinary circumstances, quite sufficient to intimidate any one. No Government officer, certainly, would fail to receive such an invitation with horror. We therefore recommended Mr. Drake to select one of his best inventions, and forward it to us for publication. The engravings on the preceding page represent the gun selected by him, and, although he states that he "does not even consider it the best of his inventions," we presume he must have a high opinion of it, or he would not have given it the preference for publication.

For obvious reasons we refrain from discussing either the qualities of the gun which Mr. Drake sends us, or the narrative by which it is accompanied. It is a very serious thing for a gentleman to be allowed to spend fifty years in designing inventions for the national benefit without ever reaping the smallest remuneration; at the same time it would be thought a still more serious thing for the public money to be expended in rewarding every one who adopted that occupation in preference to law, or medicine, or the Church, or trade, or manufactures, and who did so without at all knowing whether what he did was or was not utterly useless. The whole question in such cases turns upon the ability of the enthusiast. The course pursued by Mr. Drake, in publishing a specimen invention, is therefore a very wise one, and if it should appear that his inventions are meritorious, he may confidently, we hope, expect a speedy recognition by the Government.

The following is the inventor's own description of the gun engraved:

"The gun is intended for battery purposes, and is constructed throughout, including the carriage, of cast iron, with the exception of the screw at the breech and the bands which tie the tube (a converted 32-pounder) to the bed, on which the duplex breech or charge-chamber works horizontally in such a way as to require but little labour to work it; and the whole mass is so poised as to allow of the trail being worked freely in training, elevating and depressing the gun, which is not intended to fire at high elevations, although it may be made to do so. The breech works from right to left, and the reverse, to allow alternate loading and firing with facility, and to prevent overheating, and admits of easy cleaning; and five men are presumed sufficient to serve this gun under ordinary circumstances, its recoil being slight in consequence of its weight—about 12 tons, including everything—and so checked as to allow the gun, by the laws of gravitation, to return to its firing position.

"It is intended to fire the usual 32 lbs. spherical shot, or elongated 90 lbs. solid shot or shell. In constructing the breech with two charge chambers the weight will not be increased above 20 cwt.; at the same time a single charge breech may be used if preferred.

"Fig. 1, longitudinal elevation. A, cast iron tube—a 32-pounder, 6 ins. calibre, with the breech bored through, and rigidly secured to the stock, C, by the wrought iron bands, D. B, cast iron duplex charge chamber, with a pivot passing through the bed, C, on which it is rested, and works horizontally from right to left alternately, the bed, C, stock, and trail being cast as the carriage, in one. E, wrought iron screw to keep the joint between B A in close contact to prevent the escape of gas. In firing the gun the vertical screws, F, are slightly inserted in the seat of B, to keep the chamber in a true line with the bore of A. G, cast iron quoin for elevating and depressing the gun, and recoils with it on firing, and returns with the gun as it returns to its original position by its own weight on the inclined plane or platform made to check the recoil. It may be turned to a right angle with its present position for training.

"Fig. 2, ground plan. A B, sections of the tube and charge chamber, that in a line for firing being loaded with a conoidal shot, H, the screws, E F, keeping A B in an immovable position. When the gun is fired and the open chamber charged, the screws are slack-

ened and the breech, B, turned to bring it in a line for firing, thus keeping up a continuous fire, at the rate probably of five rounds per minute, if the gun be well mounted.

"By the late experiments at Woolwich with the American guns, the recoil with a proof charge of powder was not worth naming; thus it will appear by the simple way this gun is mounted, it will keep true to its line with comparatively no trouble to the men, with the exception of training; and a ship could not possibly pass within its range without serious injury or destruction."

ON CAST IRON PERMANENT MAGNETS.

BY JONATHAN N. HEARDER, ESQ.

The construction of cheap and powerful permanent magnets cannot but be looked upon as a great desideratum in the present day, when the development of electricity by the combined action of mechanical and magnetic force is found to be both economical and convenient for many telegraphic purposes.

The magneto-electric machine, that is to say, the machine which excites electricity by the inductive action of permanent magnets upon masses of soft iron, is modified in its power by the degrees of magnetic intensity existing in the inducing magnet, and as far as experiment has been carried, there appears to be no limit to the amount of electrical force to be developed by a judicious extension of the apparatus. That indefatigable philosopher, S. Hjorth, of Copenhagen, has carried the application of these principles to an extraordinary extent in the construction of what he terms his dry battery, by which, quantity, as well as intensity, of electrical action are produced in a degree far exceeding anything that has yet been accomplished.

As, however, the expense of construction of permanent steel magnets for these purposes increases in a very much higher ratio than the relative power obtained from them, it becomes extremely desirable to obtain this power at a cheaper rate. In Dr. Scoresby's valuable work on magnetism are to be found details of some experiments on the magnetic qualities of cast iron, which, however, seem to lead to the deduction that it is unsuitable for general magnetic purposes. It however occurred to me, that cast iron had not been submitted to a sufficient variety of tests, since, in the course of my experience, in the extensive working of cast iron, I had observed a vast number of apparently trifling circumstances which influence very materially the mechanical properties and molecular arrangements of the iron produced. These peculiarities arise from the temperature at which the iron has been melted, the admixture of different kinds of iron with each other, and many other circumstances which modify the character of different castings from the same metal. Now, as certain peculiarities in the character of steel are found to modify considerably its susceptibility to magnetic action, and as certain conditions which are unfavourable to magnetic development in straight bars are indispensably necessary for it when curved or horse shoe bars are used, I thought it likely that, although cast iron might not be adapted for straight magnets, yet the very conditions upon which its unsuitability depended might be just those which would adapt it for the construction of horse shoe magnets, and therefore determined to make a trial. A pattern was made, from which 24 horse-shoe bars were cast from good pig iron in green sand. The bars, or rather plates, were of the following dimensions, viz., 2 inches wide, 16¾ inches long from the poles to the outside of the bend, $\frac{3}{16}$th of an inch thick; the poles were 1½ inch asunder, and the opening in the bend was 3½ inches wide, and their average weight was about 3 lbs. Orders were given to the workmen to keep the sand tolerably moist in order to make them pretty hard; but this, of course, was a matter of some difficulty with so many runnings, and moreover, the quality of the iron might be slightly varied, from their being cast from a furnace used for general purposes, and not all in one day. When turned out of the sand they looked grey and hard, but in drilling were found to vary a little in hardness. A hole was drilled near each pole and one in the bend of every magnet, through which 3 screwed wires passed, which, by means of tightening nuts, bound the whole into one fasciculus 4½ inches thick. No attempt was made to make the poles flat, beyond simply holding the magnet upon the face of an ordinary grinding stone to take off a portion of the rough edges formed by the flask. A soft iron keeper was made 4½ inches by 3 inches, and 1 inch thick. The bars were then severally magnetized by a powerful electro magnet; 3 or 4 strokes on each side were sufficient to develope their full power; their magnetism, when compared with steel of equal size, was feeble, and their power of retaining it also apparently feeble; the strongest would not lift more than 4 to 5 lbs., whilst the weakest were as low as 2 lbs.

The irregular surface of their poles, however, was very unfavourable for determining this point, as some of them exhibited a higher power on having their faces ground true. As they were magnetized and severally placed in the bundle, the keeper was kept in contact with the poles, and after they were all screwed up, the magnet, weighing 72 lbs., was readily lifted by the keeper, and required an addition of more than 30 lbs. to break contact, notwithstanding the very irregular condition of the poles which could only touch the keeper in a few points. Here also a remarkable effect was observed, contrary to general experience, viz., the total lifting power was greater than the sum of its elements. After repeated separations of the keeper from the magnet, the attractive force was upwards of 80 lbs., and at the end of 12 months the power was still as much as 50 lbs. Its power of magnetizing bars was very considerable, as well as its power of inducing through soft iron.

The hardness of the metal rendering it impossible, without great expense and labour, to grind the faces of the poles true, and economy being the main object in the construction of these magnets, I was desirous of trying the effect of soft iron false poles. I have long entertained an opinion, that the real attractive power of magnets is prevented from developing itself fully on account of the difficulty with which induction takes place through hard steel; for since the attractive influence of every transverse section of a magnet has to act through the mass of steel between it and the pole, a considerable amount of power is thereby unavailable.

In the large magnet just described, a very considerable amount of attractive power was exhibited between the opposite arms, several inches back from the poles, even when the keeper was on; and it occurred to me that if the attractive power thus acting laterally between the arms, or even a portion of it, could be taken up and transmitted to the poles, an increase of effect would be produced. The readiest way of trying this experiment which suggested itself, was the application of short soft iron straps, which might be applied to the sides and inserted between parts of the magnet, so as to serve at the same time to bind on the false poles, and transmit to them any attractive power obtained from the parts of the magnet with which the straps were in contact. The magnet was accordingly fitted with false poles upon this principle, the attracting portions, however, of each pole being reduced to a surface of 5 inches long and 5-8ths of an inch wide, and these surfaces standing parallel to each other at 1¼ inches distance. Upon re-magnetizing the bars, and mounting them with the soft iron poles, it required upwards of 250 lbs. to produce the first separation of the keeper, and subsequently 150 lbs. After having been magnetized four years, during nearly six months of which the keeper was off, it still retained a power of 80 lbs. I next varnished each bar with coal tar, and found an increase in the effect, the magnet at the end of three years longer lifting 150 lbs. About this period, 1850, I sent it to the Royal Cornwall Polytechnic Society, and was honoured by the award of their second silver medal. In 1851 I sent it to the Great Exhibition, together with a very powerful steel magnet, but had the mortification, on more than one occasion, to find my two magnets lying on the table in contact with each other, similar poles being placed together, evidently the work of some one who understood the subject. Whether this was done before the judges tested them or not, I am not prepared to say, but the steel magnet lost most by the treatment, its attractive power having been diminished from 300 lbs. to 200 lbs., whilst that of the cast iron one was only reduced from 180 to 150 lbs. The latter has not been magnetised since its return from the Exhibition, and it still lifts more than 100 lbs., the weight of the magnet being 72 lbs. It is rather remarkable that whilst cast iron magnets are improved, steel magnets are impaired by the addition of soft poles, and experiment has shown that this peculiarity with regard to the cast iron is not referable to any mechanical irregularities of the attracting surface of the poles. As time is the most satisfactory test of magnetic permanency, I have no hesitation in recommending the adoption of cast iron for horse shoe magnets. S. Hjorth informs me that he has adopted my suggestions with the most admirable success, and I believe that the object which I have had in view, viz., to introduce a material for the construction of permanent magnets of great power which shall combine cheapness with efficiency, and at the same time simplicity of construction, has been fully accomplished. Since the shape of the soft iron poles can be varied to suit circumstances, the cast iron magnet is peculiarly adapted for all purposes in which rotating armatures are employed. In the magnetizing of bars, &c., the soft iron poles appear to facilitate considerably the communication of magnetic power. The expense of manufacture as compared with steel magnets of equal strength, especially when made very powerful would be as 1 to 6 or 8. It may be objected that such magnets are heavy in proportion to their strength; but to this it may be answered, that magnets of such

force seldom, if ever, require to be handled, but are generally used stationary.

According to the general standard for computing the power of a compound steel magnet, it should lift a weight equal to ten times the cube root of the square of its own weight. Upon consideration, therefore, since the cast iron magnet of 72 lbs. lifts 150 lbs. by a rough experiment, and a steel magnet of the same weight is not expected by the above formula to lift much more than 170 lbs., it follows that cast iron is not far inferior in its magnetic properties to steel, whilst it is vastly superior in economy of price and convenience of manufacture. For all useful purposes, therefore, cast iron may be advantageously employed as a substitute for steel in very large horse shoe magnets, and the trouble of remagnetizing, which process will occupy less than an hour once in two or three years, is not much more than would be met with in steel magnets, unless of very superior make. In the course of my investigations on the influence of combination on the individual powers of these magnets many years since, I was led to notice a fact entirely new in science. It was that when the magnets were separated, after having remained in combination for about four years, they appeared individually to have lost almost all their magnetism, the outer ones having suffered most. Some were perfectly neutral, others had their poles reversed, and others were so reduced in strength as to have a lifting power of only a few ounces. Only three or four would lift more than 1 lb. The sum of their individual powers amounted only to 11 lbs., whilst on putting the twenty-four magnets again into combination, they would lift more than 80 lbs. This circumstance is inexplicable upon any magnetic principles already known, and may serve to direct a new course of inquiry to those who have leisure and inclination to follow it.

Artificial Garnets.—The artificial garnet is at present manufactured to such a degree of perfection that it is almost impossible to discover the difference between the artificial and the natural. M. Phipson has, however, discovered a means of ascertaining the difference more effectually than by the best analysis. The artificial garnet, as well as some of the natural, abrades glass. But he has found that while the artificial garnet never marks quartz, the latter completely cuts into the former, although it is incapable of even scratching the natural garnet. By these means the natural garnets can be always distinguished from the artificial.—*Cosmos.*

THE SUBMERGING OF ELECTRIC TELEGRAPH CABLES.

BY CAPTAIN BLAKELEY, R.A.*

A spherical piece of stone, metal, or other substance heavier than water will sink in the latter vertically, and will acquire a velocity such that the resistance of the water shall equal the weight of the sphere minus the weight of water it displaces. If the substance have a specific gravity only slightly heavier than water, then it will acquire this velocity in a smaller space than if the specific gravity be greater. If a ship sailing in a straight line, with a uniform velocity, drop several such spheres equal in size and weight, then a line drawn through them at any moment will vary from a straight line only by the few feet or inches necessary for the spheres after entering the water to have acquired the uniform speed (either by losing a greater speed acquired in falling through the air, or the reverse). Fig. 1 will show this, the

Fig. 1.

equation to the line being evidently of the form $y = ax$, where a is the ratio of the velocities of the ship and stone, and constant, the velocities being uniform, if we neglect the very small distance lost or gained in acquiring velocity, which we may well do in the case I wish to investigate, where the depth of water is 10,000 or 12,000 feet. A cylindrical cable will very nearly follow the same law as that I have attempted to prove spheres to follow, particularly if the specific gravity be small, and the speed of the ship not too slow.

Let us examine the circumstances attending the sinking of a cylindrical cable, whose specific gravity is $2\frac{1}{2}$ (water being 1), and whose cross section is a quarter of a round inch, the diameter being half an inch. One foot in length of water by a quarter round inch would weigh about $\frac{1}{10}$th of a pound. One foot of the cable, therefore, would weigh $\frac{1}{10} \times 2\frac{1}{2} = \frac{1}{4}$ lb., and in water that would be reduced to $\frac{1}{4} - \frac{1}{10} = \cdot 15$ lbs. Such a piece of cable, sinking in water with its length kept horizontal, would acquire a velocity, v, such that the

* British Association, 1857.

resistance of the water would be $\frac{v^2}{2g}$, the height due to that velocity multiplied by the weight of 1 foot high of water on a base 1 foot by half an inch, or about 3 lbs., this product being the weight of a column of water of the height due to the velocity, v, and on a base the area of the cable. This we must diminish, as the surface is cylindrical, not plane; but as the friction is great, we shall not underrate it in assuming a coefficient $\frac{5}{6}$ as expressing the variation from the resistance of a plane surface. As the resistance of the water upwards is evidently equal to the effect of the weight of the piece of cable downwards, we have the equation

$$\frac{v^2}{2g} \times 3 \times \frac{5}{6} = \cdot 15 \text{ lbs.}$$

Calling g, the force of gravity, 32 feet,

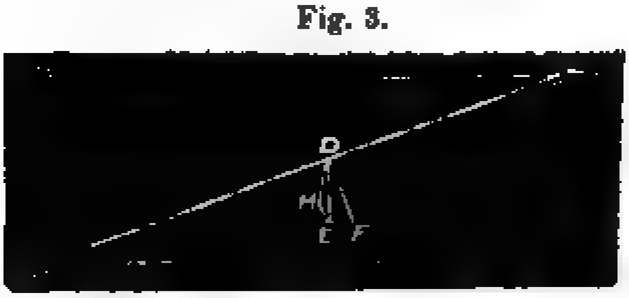
We have $\frac{v^2}{64} \times 3 \times \frac{5}{6} = \frac{5}{128}$. $v^2 = \cdot 15$, $v^2 = 3 \cdot 84$ $\therefore$ $v = 1 \cdot 9$ feet per second, or 1·3 miles an hour. But the cable is not laid flat on the water and allowed to sink, but dropped gradually as the ship advances; and if the speed be uniform and not too slow, I have endeavoured to show that the cable would form nearly a straight line. The end first immersed might take any angle (see fig. 2), but in a cable some miles

Fig. 2

in length, there would be but slight variation from a straight line.

Let us find what should be the speed of a ship to make the angle of the cable such that the depth at which any part is (while sinking, or at the moment of reaching the bottom) shall be one-third the distance sailed by the vessel since that part was submerged. (See fig. 3). Let v = the ve-

Fig. 3.



locity with which the cable sinks; then $3v$ = velocity of ship. The forces acting on the cable are that due to its weight, and the action of the water, *perpendicular to the length of the cable*, and in a vertical plane. (I suppose the case where there are no currents). Drawing D F perpendicular to B C, the cable, at any point D, and D E vertical, let us take D E to represent the weight of the cable, and from E draw E H parallel to F D, that is to say, in the direction of the resistance, and taking E H equal to the pressure of the water, then forming D H, gives us the direction of the motion of the cable. I will not now inquire what the exact line of motion is, but neglect its variation from the vertical, merely calling attention to the fact, that it must always be slightly backwards, if I may use the expression. The resistance of the water to a foot of cable $= \frac{v^2}{2g} \times 3 \times \frac{5}{6} \times \frac{\text{E D}^2}{\text{F D}^2}$, being that found before as due to moving perpendicularly to its length multiplied by $\frac{\text{E D}}{\text{F D}}$, the proportionate number of particles of water it meets, and by $\frac{\text{E D}}{\text{F D}}$ the proportion of the pressure of those particles which is perpendicular to B C. The triangles D E F and C A B being similar, we have the resistance

$$= \frac{v^2}{2g} \times 3 \times \frac{5}{6} \times \frac{3^2}{(\sqrt{10})^2} = \frac{9}{256} v^2.$$

But the resistance which balances the weight, if I may use the expression, is that only which is vertical, or

$$\frac{9}{256} v^2 \times \frac{3}{\sqrt{10}} = \cdot 15 \text{ the weight,}$$

$$v^2 = 4$$

$$v = 2$$

and the speed of the vessel therefore $3 \times 2 = 6$ feet per second, or 4·1 miles an hour. The cable would reach the bottom at 2,000 fathoms in $\frac{2000 \times 6}{2}$ seconds, or 100 minutes, and the cable paid out would slightly exceed $2000 \times \frac{\text{B C}}{\text{A B}} = 2000 \times \sqrt{10} = 6300$ fathoms when the ship had moved 6,000. Of course, if the vessel goes faster the cable sinks more slowly, and there is less waste, but engineers engaged in the work think that a speed exceeding 6 miles an hour for the cable to issue from the hold of a vessel is unsafe.

I think I have succeeded in proving that there is not much waste with a light cable,

even when it issues at the safe rate of $4\frac{1}{10}$, or, to avoid the possibility of exaggeration, say $4\frac{1}{2}$ miles an hour. If a less speed be desirable we must have a still lighter cable, which may, however, be allowed to sink as fast as the other, by diminishing the speed of the vessel, thus increasing the angle of inclination, reducing the number of particles of water met, and reducing the effect of those perpendicularly to the cable, and also reducing the portion of that effect which can be resolved into a vertical pressure. However, as this vertical portion of the pressure on the cable diminishes, the backward and horizontal pressure increases; so that I cannot help thinking we should keep the angle of inclination as small as possible, without letting the cable be so long in sinking as to be acted on by currents. An hour and a half in a sea where no currents are ascertained, though it has been navigated for many centuries, does not seem to me too long a period; for even if there be currents in an ocean, they are probably broad ones. One could not, for instance, well meet a current from east to west while the ship is passing, say ten miles from north to south, and then suddenly find a rapid current from west to east; and if the currents do not change, and change too several times in that sudden manner, their injurious effect seems to me to have been overrated. Taking my former example of spheres of equal size dropped from a ship, it appears to me that they would reach the bottom in a straight line, the depth being equal, so long as the current is uniform: and I cannot conceive the existence of two undiscovered currents side by side, and in opposite directions, in any ocean. However, be the danger from currents what it may, it seems to me that a heavy cable, *prevented from sinking by friction applied in the ship (by machinery not always under control)*, is subject to the same danger as if it be the same period sinking by its own weight.

Indeed the advantage claimed for heavy cables is, that they do sink rapidly. If that is so desirable, why the friction on leaving the ship which prevents it? If it is not desirable, why the great specific gravity of the cable which causes it? I approach this part of the subject with great diffidence. For every day during the past week, the newspapers, without exception, have been full of the praises of cables of great specific gravity by engineers, naval officers, and editors. Not one has had a syllable throwing doubt on the necessity for great weight. This morning even, there appeared testimonials from all those talented and experienced gentlemen lately engaged in the attempt to lay a cable across the Atlantic, to declare that they recommended no change in the cable, and going still further, by advising the part yet to be made to be exactly similar. Under these circumstances, I may well shrink from attempting to prove that they are one and all mistaken; that the rapid sinking to the bottom said to be necessary in one paragraph of their communications, is acknowledged in the next to have been impeded by great and dangerous friction. While I continue to read to you, therefore, I have a lurking fear that in my calculations I have made some absurd blunder, and if I have I must beg you to excuse the valuable time I have occupied in an endeavour to throw light on a subject of such importance.

Let us examine the case of a cable, the same size as the last, but double the specific gravity, which, therefore, would be 5, and the weight per foot of the cable ·5 lbs., and the weight in water ·5—·1 = ·4lbs. Such a piece sinking in water with its length parallel to the horizon would acquire a velocity v such that its weight in water,

$$\cdot 4 = \frac{v^2}{2g} \times 8 \times \frac{5}{6}$$

(as before) but the weight being greater the velocity increases as the square root of the weights, giving us

$$v^2 = 4 \times 2 \times 32 \times \frac{1}{3} \times \frac{6}{5} = 10{\cdot}24$$

$v = 3{\cdot}2$ feet per second, or about 2·19 miles an hour.

A vessel moving at the rate of 2·19 miles an hour, dropping a cable in 2,000 fathoms = 12,000 feet water must, if that sink at the rate of 2·19 miles an hour, pay out $12{,}000 \sqrt{2}$ feet at least, that being the

Fig. 4.

length of a straight line, or the shortest possible distance between the point where a piece of cable would just be reaching the bottom of the ship, for whatever be the curve it must be longer than the straight line. But the cable, if sinking with its length at an angle of 45° to the horizon, would only meet $\sqrt{\frac{1}{2}}$ particles of water compared to what it would meet if the length were horizontal, and those would only exert $\sqrt{\frac{1}{2}}$ as much pressure on it; that pressure

also would be $\sqrt{\frac{1}{2}}$ horizontally, and $\sqrt{\frac{1}{2}}$ vertically, therefore the velocity would be $2{\cdot}19\sqrt{2^2} = 3{\cdot}52$ miles an hour. A vessel would evidently have to keep moving at a rate of $3\frac{1}{2}$ miles an hour, and paying out cable at the rate of $3\frac{1}{2}\sqrt{2}$ = nearly 5 miles an hour, to keep the cable at this angle. This is leaving out of the calculation entirely that part of the action of the water against the cable, which can be resolved into a horizontal pressure, and which, at an angle of 45° is very great, and evidently would make more cable necessary.

What I have attempted to prove thus, is this:—That a ship moving at the rate of $3\frac{1}{2}$ miles an hour, and paying out a cable $\frac{1}{2}$ inch thick, and of a specific gravity of 5, must pay out *not less* than 5 miles in an hour, unless it check the sinking of the cable. Now this rapid sinking is the only advantage I have ever heard mentioned as to be derived from a great specific gravity, and it is evident that no friction or other strain can be applied to the cable without lessening the speed of its sinking, as any strain in the direction of the length of the cable can be resolved into others, of which one is vertically upwards, and equals the strain multiplied by the sine of the angle of inclination.

Let us examine the conditions of a cable at an angle such that it reaches the bottom twice as fast as the ship moves. Neglecting, as before, the horizontal action of the water—and in so doing, I give the heavy cable a great advantage in the argument, for that horizontal pressure can only be counteracted from the ship by a strain in the line of the cable, which must also keep the cable suspended and as liable to the action of currents, if I may use the expression; neglecting, I say, this pressure, we have the vertically upward pressure of the water =

$$\cdot 4 = \frac{v^2}{2g} \times 3 \times \frac{5}{6} \times (\sqrt{5})^2$$

$$v^2 = 10{\cdot}24\sqrt{5^2}$$

$$v = 3{\cdot}2 \text{ feet} \times \sqrt[4]{5^2} = 10\tfrac{3}{4} \text{ feet}$$

a second = $7\frac{1}{4}$ miles an hour. The speed of the vessel must be $3\frac{3}{4}$ miles an hour, and the cable paid out *not less* than the straight line or $\sqrt{5}$ = nearly $2\frac{1}{4}$ miles for every one mile of progress.

Now I see no method of applying any considerable horizontal force from the vessel through the cable, as that can only act in the direction of its length. Were the lower end quite free indeed, it could be dragged along, but under 2,000 fathoms of water it would be difficult to drag along any considerable length of cable; and it is evident that the difference between the tensions at A and B, fig. 5, is the only

Fig. 5.

available power. Were the ship to stop, and fastening the cable (supposing it strong enough) to proceed very slowly, it seems to me that for all the horizontal movement gained above an equivalent would be lost below, unless indeed the cable drag.

To gain some idea of the pressure of water to be overcome, let us take the example of a cable which is loose at the bottom, and the vessel going at such a speed that the angle of the cable is 60°; then let the effort be made only to pay out cable equal to the distance passed over by the ship. If A, fig. 6, be the point where this

Fig. 6.

is commenced, and from any point, C, further on, if we draw a line at 60°, and take C B = C A, then A B C is an equilateral △. (I take this example for the facility of calculation only, the sines and cosines of 60° and 30° being so well known). Now if the cable move in the direction A B, E arriving at F, the depth of water being 2,000 fathoms, we have an area *a* acted on equal to 2,000 fathoms $\times\frac{1}{2}$ inch $\times$ sin 60° = 475 square feet.

Let D = weight of cubic foot of water = 70 lbs.; weight of cable in water = 4,152 lbs.; v = velocity of cable in the direction A B, =, in this case, that of the ship. Then the pressure of the water perpendicular to the length of the cable is

$$\frac{adv^2}{2g}\sin^2 60° \times \tfrac{5}{6} = 325\, v^2.$$

This can be resolved into a pressure upwards of $325v^2 \cos 60° = 162{\cdot}5v^2$; and a horizontal pressure of $281v^2$.

Let T=tension on cable from C to B (which let us suppose uniform) then T cos 60° is its horizontal equivalent, and T sin 60° the vertical. This gives us the two equations

$$T\times\frac{1}{2}=281v^2\ldots\ldots(1),$$

$$\text{and } \frac{173}{200}T+162\cdot5v^2=4{,}152\text{ lbs}\ldots\ldots(2),$$

$$\text{from (1) } \frac{173}{200}T-486\cdot1\,v^2=0$$

$$\therefore 648\cdot6\,v^2=4152$$

$v=2\frac{1}{2}$ feet per second, or $1\frac{1}{2}$ miles an hour. T=32 cwt. 16 lbs.

this strain, be it remembered, being that when the lower end of the cable is loose, or else the excess of the strain over the friction of the cable on the bottom. An examination of the equations shows us that, with a greater speed, the pressure of the water upwards would have been more, and that A would not have reached B, the cable probably taking a form C G H. On the other hand, with a less speed, the curve would be on the other side of B, as at CKL, but this when the lower end of the cable is loose only.

If these calculations be at all accurate, indeed if they are exaggerated against the case of the heavy rope as 4 to 1 (though my endeavour has been in the opposite direction), still I say, with three-fourths of exaggeration, it seems to me difficult to manage a rope once in the water, and I cannot but think a light rope not only preferable, but for some depths of water the only one possible without a waste of heavy rope double the entire length of light rope required.

THE ABBÉ PAUVERT'S IMPROVEMENTS IN THE MANUFACTURE OF IRON AND STEEL.

Considerable curiosity has been expressed in reference to the inventions of M. L'Abbé Pauvert, of Chatellerault, France, in consequence of an exciting notice which appeared some time since in the letter of the Paris correspondent of the *Times*. We take the earliest opportunity, therefore, of making known the nature of these improvements in the manufacture of iron and steel. The inventor has obtained patents for three inventions in this country. The first—for "certain improvements in manufacturing iron"—is thus described by him:

"The object of this invention is to deprive or drive off from puddled iron sulphur, phosphorus, and other metalloids by cementation; it is applicable to puddled iron in any of its stages or states. I employ a cement composed of the following substances:—14 parts (by weight) oxide of iron; 30 highly aluminous clay; 50 carbonate of lime or wood ashes; 4 finely divided charcoal; 1 carbonate of potassa; 1 carbonate of soda. These proportions need not be rigorously adhered to, but may be varied, and one or more of the substances composing the cement may be dispensed with, according to circumstances and the nature of the iron. I place the iron with the cement in layers into a cementing furnace, and I heat the furnace in the ordinary manner. This iron, after cementation, is welded, and then drawn into bars. It thus becomes as soft and as tenacious as iron made with charcoal. The many electric currents produced by the mutual reaction of the elements, the reduction of the earthy and alkaline metals, and of a portion of the oxide of aluminum, favour the escape and the absorption of phosphorus, sulphur, and other metalloids. In order that all the carbon may be decomposed and disappear in the state of oxide or carbonic acid, it is necessary that the carbonates and oxides should be in excess."

The second invention—for "certain improvements in manufacturing cast steel"—he thus describes:

"The object of this invention is to decarbonize cast iron by prepared oxide of iron, and to free it from gaseous and solid metalloids. I crush cast iron heated to a red heat under rolls, or under a tilt hammer, or broad faced forge hammer. The portion of the cast iron reduced to a fine powder serves for the preparation of the oxide, while that which is in coarser particles serves for reguluses or metal. To render the oxydation complete, the powdered cast iron is wetted with pure, acidulated or alkalized water. To obtain cast steel I have recourse to the processes and apparatuses now used for fusing. I place in a melting pot from 33 to 40 parts (by weight) of oxide prepared as just stated, to 100 parts of crushed cast iron to every 100 parts cast iron; 8 or 10 parts of the following composition are added (which must be kept as free as may be from exposure to the air): 4 parts (by weight) dry carbonate of soda; 4 dry carbonate of potash; 3 wood ashes; 2 borax; 3 oxide of manganese; 4 to 7 hydrogenated carbon, soot or lamp-black. These ingredients should be carefully mixed, but the number and proportions may be varied according to the product desired. Instead of oxydized cast iron, iron filings or iron raspings may be used, the same being oxydized by the same process. Instead of 4 parts dry carbonate of potass, 2 parts caustic potass may be employed. The numerous reactions of these ingredients produce the following effects:—1. The generation of numerous electric currents. 2. Complete reduction of the manganese and oxide of iron (produced by the oxydised cast iron or iron filings) which unite with the steel. 3. Reduction of the earthy and alkaline metals and borax which absorb the metalloids. 4. Disappearance of the *nitrous* gases, because potassium, sodium, and calcium reduced in presence of steel and of carbon in an incipient state absorb *nitrogen* and form cyanides of potassium, sodium, and calcium. 5. Formation of larger crystals in the steel, when it cools down, than have hitherto been produced in steel."

The third invention—for "certain improvements in manufacturing steel and cast steel"—he describes as follows:

"The object of this invention is—1. To purify iron, and to combine it chemically with carbon by cementation. 2. To convert it into cast steel of superior quality, whatever the nature of the iron first employed, I make use of a cement composed of the materials and in about the proportions following:—33 parts (by weight) of finely divided charcoal; 33 parts of highly aluminous clay; 33 parts carbonate of lime or wood ashes; 1 part carbonate of soda; 1 part carbonate of potash. I stratify the iron with this cement in an ordinary cementing

furnace, and heat it in the same manner as is now generally followed. I thus obtain a steel possessing all the qualities of that known as German, or "Rives," or shear steel (*acier d'Allemagne ou de Rives*). The successive heats and firings do not cause it to part with the carbon which is intimately combined with it, as in cast or in shear steel. And for this reason, carbon having but a small affinity for iron, requires, in order to enter into intimate combination with it, 1st, to be added in an incipient state; 2nd, to be assisted in its combination by numerous electric currents. Now these conditions are fulfilled by my process, for—1st. The mutual reaction of the carbon and the carbonates causes the greater part of the carbon to assume a molecular state; 2nd. This *change* of the carbon and of the carbonates, the action of the red-hot iron upon the oxides of aluminium, of calcium, of potassium, of sodium, with the carbon in the molecular state, produce or generate numerous currents of electricity. Further, the earthy and alkaline metals appearing in an incipient state, greedily absorb sulphur, phosphorus, and the other metalloids. Thus prepared, this steel may be used as shear steel or German steel (*acier d'Allemagne*), the properties of which it possesses. In order to convert this steel into cast steel, the ordinary processes of fusing in pots is followed, but with the addition to the metal in the pots of from five to six per cent., by weight, of the following mixture, which, as far as possible, must be kept from contact with the atmosphere:—4 parts (by weight) dry carbonate of soda; 4 parts dry carbonate of potash; 3 parts wood ashes; 2 parts borax; 3 parts oxide of manganese, 4 to 7 parts hydrogenated charcoal soot, lamp-black, &c. The four parts of carbonate of potash may have substituted for them two parts of caustic potash. The mixture of these substances should be effected with care, and their number and proportions may be varied to suit the nature of the products to be obtained."

The reactions of these substances are said to be the same as in the former case.

AN IMPROVED FLOATING BUOY OR BEACON.

At page 485 of our 63rd volume, we published a description of an iron floating buoy or beacon, designed so as to ride easily, and remain perpendicular, or nearly so, in rough water. The essential feature of the improved buoy consisted of a conical hole in the centre, into which the chain used for mooring it rose, being made fast near the centre of gravity of the vessel. M. Trajano de Carvalho, a gentleman belonging to the Naval Architectural Department of the Imperial Brazilian Navy, having heard that this buoy was found in practice somewhat defective, has designed an improved buoy, with the same objects as in the former case, and has favoured us with a sketch of the same. M. Carvalho's buoy is represented in section in the annexed engraving.* It is spherical in form at the lower part, and it will be seen that the aperture in the bottom is dispensed with, the mooring chains being attached to a link at the bottom of a pair of rods, the upper extremities of which turn on pins or bolts. These pins or bolts are fitted at the height of the centre of the sphere of which the bottom of the vessel forms a part, and pass (for the sake of strength) into a cross beam, which at the same time forms a step for the mast or pole. The beacon is formed of a series of hoops or half-hoops, which may be painted red, to enable them to be better seen at a distance. The improved buoy is ballasted so that its centre of gravity falls below its centre of form, and if situated in a current, would swing across the tide, and itself float upright, while the rods were inclined at an angle more or less great to the surface of the tide. Such a buoy would be particularly valuable in those Indian rivers where the current is strong, and in which it frequently happens that the existing buoys will not "watch," as it is termed,—that is, keep upright and in sight.

* The mast or pole of the beacon is considerably shortened in the engraving, to save our space.

Electric Light.—A novel and happy employment of the electric light was recently made at the college of Stanislas, by the process of M. Duboscq. A great hall, where a thousand persons were assembled at a literary soirée, was lighted for three hours by an electric light, without sensible intermission. The light produced was sufficiently strong to enable persons to read ordinary type at a distance of 100 feet from it, and at the same time was not inconveniently intense.—*Cosmos*.

EXTENSIVE NAVAL AND MILITARY IMPROVEMENTS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—When you published a description of the American breech-loading guns purchased by Lord Panmure for the Government, to convince you that I may be considered to have some knowledge of guns and their effects, and that I have no desire to intrude opinions unsupported by acts to sustain such remarks as I may venture to intrude on public notice, I placed before you about 400 practical drawings bearing on this important national subject, which form but a limited example of what I have produced, at a cost which, you may readily conceive, must have been made at a sacrifice of time and of money amounting to many thousands of pounds. It may be asked by you, as it has by many associated with the Government and others, "What could have induced me to devote the greater part of fifty years to the improvement of subjects so ill calculated, without political patronage, to remunerate me for my labour?" To answer this question fully would be next to an impossibility, under all the aggravated circumstances associated, in the pages of a professional journal; and your readers must be content, for the present, by my simply stating that *public duty* has had no small share in thus prompting me to produce more, probably, than any other subject of Her Majesty, past or present; but on this I will not enlarge beyond what is necessary.

About the year 1808, while under training for that branch of the military service then called the Royal Engineers, as distinct from the Artillery, some portion of my time was devoted to the study of naval architecture, which attracted the attention of the Surveyor and Commissioners of the Navy, and I was prevailed upon, in 1809, and at the wish of the First Lord of the Admiralty, Viscount Melville, to whom I had been formally introduced, to join the civil department of that branch of the public service; and for nine years I had a practical opportunity of witnessing the use of guns for marine and land purposes. But it was not till the 6th of May, 1829, while attending the practice of artillery, in company with some of the senior officers of that service with whom I was intimately acquainted, that I commenced the practical improvements to which I called your attention. Here permit me to repeat, what I observed to you at the time, I am fully prepared to admit the right of the Government to avail themselves of every improvement calculated to promote the interest of the state, without regard to who is the inventor, or to what country he may belong; and this is a principle I have frequently urged those who have the power to adopt; therefore, I stand in no way prejudiced against any inventor, believing, as I do, all more or less are benefited by public improvements, which should not be confined to person or place, but thrown open to all. It has now become an act of duty in me to place before the public a few plain statements bearing on this question, in such a form as will, I humbly hope, lead to some useful result, seeing that the time has arrived for England to give the most extensive encouragement to improvements so much identified with our national security and prosperity at home and abroad.

My first improvement was that of training and working guns with greater facility and with less danger to the men, by a protected embrasure, and the construction of the face of the works, epaulments, parapets, &c., which, from personal observation, appeared to me very defective. Subsequent to this, between 1829 and 1839, the construction of the gun itself commanded my attention, and I made a number of plans for loading them at the breech, after consulting with some of the oldest and experienced officers and gunners in the service, who admitted the importance of the principle provided it could be mechanically carried out with safety. And here I beg to remark, I had never seen or heard of a gun designed for loading at the breech, personal observation dictating its advantages; and since the year 1829, I have lost no opportunity in my endeavours to command Government attention, particularly that of the Admiralty.

At the date named, the late General Sir James Kempt, to whom I had been long known, was Master General of the Ordnance; but a political change in the Government, which caused the Duke of Wellington to resign, deprived me of the power of consulting in person with the Master General as intended, having called his attention to my ordnance improvements previous to his resignation.

At the time the Orleans dynasty was established, my attention was called to the subject of coast and harbour defence; and when England became alarmed at the weakness of her defensive position, I devoted my time exclusively to this subject, and invented destructive guns of 12-inch calibre, with ranges in proportion to the duties which they would have to discharge; but as I was not in circumstances to practically demonstrate the importance of my inventions, and not politically favoured with patronage to command the attention requisite to secure success, my efforts were comparatively useless. Dr. H. Drake, who had

been trained young as a civil, naval, and military engineer, during the time he was studying mathematics and mechanics under a professor at Glasgow in 1839, made some improvements in breech-loading cannon also; and shortly after, with the best of feeling, to serve his country in time of need, consulted the veteran general, Sir Harry Smith, and other distinguished men, relative to improvements useful in the war just then commenced with Russia, and was advised to bring them under the notice of the Government. I had an interview with the Master General, who directed me how to act; but as I found routine difficulties in the way of progress, I felt it to be my duty to submit my letter, subsequently addressed to Sir Hew Ross, to the Right Honourable Sir George Grey, to whom Dr. Drake and myself have been for many years known. Sir George, approving the contents of the letter in question, forwarded it in due form, when we were required to attend the Select Committee at Woolwich in 1854, who gave much attention at the time to the several plans which were placed before them. To the direct loading guns at the breech the Chairman was strongly opposed, because, as he observed, "the *parts would not vibrate* together," and our attention was called by the Committee to the Swedish breech-loading guns at the proof department, Woolwich, as being much the same as some I submitted. I closely inspected those guns, and found them mechanically inferior to my inventions, which I clearly and distinctly stated to the Committee. The merits of other plans before them appeared to give satisfaction, and the President gave to the name of one gun invented for coast defence, on the principle submitted—as it contained nine charges, all of which could be fired within the space of one minute, free from danger—the name of revolver; but, on this principle, I have invented from a single charge up to the number named, small arms and artillery *for every use*, varying from a 32-gauge to a 12-inch calibre, to fire spherical or conoidal shot and shell, my improvements in the construction of projectiles commencing in 1845, if I recollect rightly.

No report having been made on our several inventions, when we visited the Committee under the control of Lord Panmure, January, 1856, the new Chairman at once admitted that breech-loading guns were not objected to on principle, and he observed that they had one of which he seemed to approve, but did not name anything further, and which I presume to be the same as the guns ordered by the Minister at War from America. We came before the Committee prepared to discuss the merits of our inventions, mathematically and mechanically; but not the shadow of a chance presented itself, and Dr. Drake, who had visited London expressly three times from a distance of nearly 300 miles, and at a considerable expense and neglect of private business, saw himself under the necessity of returning, and giving up all hope of any good resulting from his exertions, although strongly introduced to the heads of other departments as he was.

Anxious and willing on my part to conform to the wishes of the Committee, I spared no trouble; but all was to no purpose, as the Committee declined to recommend a single trial, and I also was under the painful necessity of declining to submit anything further; and it cost me several months' exertion to get back those inventions which it was never my intention to place in their hands, for the future use of the service, in a form which would deprive me even of being acknowledged the author; and I regret exceedingly to say, bitter experience, too prolix for me to notice, suggests the propriety of the Government making appropriate changes in the public departments, so far as it relates to the *merits* of plans such as those to which I felt it right to call your professional attention.

Permit me to observe, so far as my inventions in the construction and mounting of cannon go, they embrace loading at the muzzle with facility, and free from danger in every respect; loading in the middle and at the breech; and the American guns made choice of by Lord Panmure will be found among that class which makes the charge-part of the gun complete in itself, irrespective of the tube, however long it may be necessary to make it; and it was the certainty of *safety* in this principle which commanded the attention of the Chairman of the Committee in 1854, several plans of which we brought under his notice.

Since that date, and even since the publication of the *Mechanics' Magazine* of Saturday, July 25, 1857, in which the American guns are described, I have traced all the improvements, embracing those of American origin relating to breech-loading, and I am quite prepared to show not a single invention has been made but such as will be found among the drawings I placed before you, most of which are too complicated to be of practical utility; and I will go so far as to state my inventions are not only less complicated, but less expensive, and consequently more valuable for public use. Confining my remarks more immediately to the construction of cannon, and without any desire to deprive the American gentleman of any merit which may be

found in his plan now under trial, England, I am sure, will not consider me out of place in placing before your readers one simple gun out of many which I have invented, with the charge chamber detached from the tube or chase of the gun, of the same calibre, and intended to fire the same weight of shot, rifled, or on the "no windage" principle, with a smooth bore, to fire projectiles constructed expressly to supersede the necessity of rotation for general use. It is invented for coast and harbour defence, and so mounted as to fire at elevations not exceeding 10°; at the same time I beg to remark, I have others so mounted as to fire at higher angles, should they be so required, and of 12 inch calibre, for destructive purposes far beyond anything known to the British service anterior to the date of invention. And here I think it right to remark, the manual exertion required to work those guns *without complicated engineering* will be less in proportion to the weight than the present practice, by one-half; and the way in which they are protected, the concentrated broadside of a line-of-battle ship, at the most destructive range, will pass off with comparatively little or no injury to the fortifications, and without injury to the men working the guns. To this I have directed the attention of Lord Panmure and the Committee, at fitting opportunities, as my correspondence will show; but, as before observed, I have not been fortunate enough to command the slightest attention, even at the time experiments were in progress which would have been attended with very little expense or trouble, if made in compliance with the suggestion which it became my duty to make, seeing that a partial adoption of my plans were being carried out under influence more favourable than I had the good fortune to have at the time I came before the Committee prepared to place my services at the command of the Government, without stipulating conditions of any kind in return; feeling, as I did, the war in which we were then engaged made it imperative in every faithful subject of Her Majesty to contribute his services and exertions free from everything in the shape of favour in return.

The gun submitted for publication is a compound one, the chase or tube being a common 32-pounder with the breech bored through, and the trunnions taken off, but which in some of my plans are allowed to remain; and it is rigidly fixed to the bed or stock carriage, which is continued in length to receive a duplex charge chamber, which revolves horizontally with a pivot passing through the breech end of the bed, on which it works freely on friction rollers, if found necessary to introduce them to facilitate its working. As the tube and breech are so firmly bedded in a line on an unchangeable stock, it is not considered requisite to lock them together; and the joint, if truly fitted, will be sufficient to prevent the escape of gas, even in the opinion of experienced men, without the stockhead through which a screw passes to force the charge chamber in close contact with the tube. The breech, which is a perfect gun in itself, works alternately from right to left to facilitate the fire, the loading taking place on each side of the gun, the open chamber being charged and returned in a line with the tube for firing; and if the tube requires cleansing, both chambers are turned clear of the bore for that object. The weight is so evenly balanced, that the training, elevation, and depression is performed with little trouble, the trail of the carriage resting on a wedge or quoin, the same as the breech of the commonly mounted gun.

The simplicity of this gun will allow it to be fired two to one with the American guns lately imported, and with a less number of men; in fact, five men will serve it well, two on each side and one at the breech, its weight, when constructed and mounted to fire elongated projectiles of 90 lbs., being about 12 tons, with a recoil so small that it may be checked by an inclination on the platform, so as to keep it always out to a firing position, relieving the men from the duty of running out. Cost, complete, about 250*l.* per gun. When the Chairman or President of the Select Committee of 1854 asked me the weight of some of the long range 12 inch calibre guns constructed on this principle, I gave about 25 tons, including the carriage, a weight by no means objectionable, when the process of working, as submitted, was taken into consideration; and I have since submitted to the inspection of an experienced civil engineer, guns of 12 inch calibre, mounted for coast and harbour duty and battery purposes in general, impregnable in every respect,—which complete would make a moving weight of 200 tons; and twelve men could perform everything, and keep up a continuous fire of four or six shots per minute, following a passing object with the greatest ease imaginable; but, confining my remarks, so far as I can, to the subject affecting the American guns, I beg to observe, as Lord Panmure and the Woolwich Committee of 1856 have admitted the principle on which they are constructed, namely, a breech-charge chamber complete without loading through the breech, I can assure his Lordship, among the numerous inventions from which I wished the Committee to select, are to be found many equally efficient with the one proposed, and less expensive and of less

weight than those selected since I first submitted my inventions to the Ordnance Department through Her Majesty's Principal Secretary of State for the Home Department, the Right Honourable Sir George Grey; and whatever disadvantage I may have sustained through routine or mistaken economy, so far as I am individually concerned, I am quite willing, for the good of my country, to pass it as though it had never taken place, and remain prepared to discharge my duty to Her Majesty by placing the whole of my inventions at the minister's command, provided I am not to be further injured for so acting.

Every day, as before remarked, strongly impresses upon the notice of England's Government the necessity of the public departments being prepared to keep pace with the improvements of the age; and I respectfully beg to assure you, Gentlemen, as it respects our national defence on shore and afloat, I have not devoted fifty years to its improvement without having arrived at some sound and valuable practical results; and why should England be deprived of its benefits because I am not in a position to find the money to bring them under public notice, as the false economy of the service, and the blighting influence of routine seem still to demand?

I am, Gentlemen, yours, &c.,
JOHN POAD DRAKE,
Naval, Military, and Civil Engineer.

SKID FOR VEHICLES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I enclose a sketch of a skid for the wheels of vehicles, which, should you deem worthy a place in your valuable Magazine, you would oblige a nine years' reader. In this skid I place a small wheel, *c*, inserted between arms (made of steel) which are fixed by bolts or rivets to

the fore part, *b*, of the skid, which has a portion cut away, so as to allow the small wheel to rise when applied for skidding a vehicle going down hill. The utility of the skid is, that when so applied it will run in the line of the wheel of the carriage until it meets with a resistance, and enables the carriage wheel to rise and run into the hollow part of the shoe shown in dotted lines, *a*.

I am, Gentlemen, yours, &c.,
H. G.

8, Copenhagen-street West, Islington,
August 25, 1857.

CEILING GAS-BURNERS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I am convinced that it is a fallacy to place jets of gas so near the ceiling as we now often find them, unless considerable light is required to be thrown downwards, which is certainly not always the case, or else why do we find them in many cases without reflectors? By placing them so near the ceiling, they only give half the light which they would do if hung in the middle of the building, so that where one would do if placed in the ordinary way, two are obliged to be had when at the ceiling. The reason is or ought to be obvious. A body of flame throws out light in all directions; hence, when placed so near the ceiling, we have only one-half of the circumference of light, and thus we want two to make it up. What I say will be found to be true by a person going into any building where these ceiling lights are used, when he will, I think I may say, always find two, whereas one of the ordinary kind —that is, suspended from the ceiling—will be sufficient to light a building equal in size, which also may be proved by observation.

I am, Gentlemen, yours, &c.,
J. A. D.

MILITARY WEAPONS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Fully believing in Lord Brougham's eloquent declaration, spoken some time back in the House of Lords, viz., that "it was decreed we should always have wars *quo tempore primum* Deucalion threw stones backwards," I think I may do some service by stating that I can enclose a roll of paper containing information or commands, in the wooden shaft of either my rifle signal whistle, or rifle explosive percussion-bolt, both of which can be thrown to the distance of 1,000 yards from a rifle of 1-inch bore, using a guncotton cartridge. Specimens of these riflebolts are to be seen at the South Kensington Museum of Inventions.

J. NORTON.

Rosherville, Sept 7, 1857.

FRICTION COUPLINGS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—It may save Mr. Francis Wrigley, of Long Island Iron Works, Carlisle, much trouble to know that the principle of friction coupling which, according to the notice in the *Mechanics' Magazine* for the 29th ult., he has patented, is shown and described in Mr. John George Bodmer's patents, No. 8912, 9702, and 10,243; that

models of various modifications of apparatus are now being exhibited at the Museum of the Commissioners of Patents at South Kensington; and that friction apparatus made upon this principle have been in use in Lancashire, as well as in London, for many years.

I am, Gentlemen, yours, &c.,
R.

August, 1857.

INSTRUMENT FOR MEASURING THE CIRCUMFERENCE OF A CIRCLE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—If you consider the following worthy of a place in your Magazine, I should be glad to see it there.

I propose to make a delicately-turned brass wheel or wheels press against an even bar of the same metal sliding in grooves, so that a turn or half turn of the wheel may cause the bar to traverse the same distance, which may be noted by means of a graduated scale, or else by distances marked on the bar itself. This, I think, cannot fail to give a very accurate result, and would be the best graphical method of solution as yet obtained; yet it would evidently be nothing but an approximation, the nearness of which would depend upon the perfection of the instrument.

I am, Gentlemen, yours, &c.,
J. A. D.

BOAT-LOWERING APPARATUS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I have already (in your Number for August 22) so plainly disavowed all personal interest in Mr. Clifford, that I have but little to say in reply to the epistles of Captain Kynaston, and of his friend who has adopted a misnomer.

I have not the faintest objection to breathe to the appropriation of the moderate amount of credit which truly belongs to Captain Kynaston. As he is a wounded seaman, I respect him sincerely, and should grieve to mention him with any unfairness. I now abandon the discussion, believing that my letters have answered their avowed and only end—that of guarding a useful inventor from wrong, and a useful invention from obstruction.

"Fair-play" is, I see, one of those gentlemen who knows enough of men to be aware that post captains and lawyers are not without some advantages over a "news-agent"; hence he carefully tells us what Mr. Clifford is. Well! If Mr. Clifford's calling is that of a news-agent, his invention is the best we have ever had for lowering boats; and we must, if necessary, forget his occupation and respect his ability. Of course, if I had been the distributor of mind and intelligence, I would have given it all to post-captains and lawyers, and have delighted "Fair-play." But we do not make the world; we merely take it as we find it, and do the best we can in it. Even ourselves we cannot much improve, and therefore as "Fair-play" is, as he says, a much better, cleverer, and more respectable person than I, I must be content henceforth to regard his virtues as a mere

Spectator.

MR. PRATER ON SOUND.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Permit me to answer Mr. Prater's inquiry, "Have I ever made an experiment?" in the affirmative; though, unfortunately, like himself, not on this subject; also to thank him kindly for mentioning myself in the same sentence with Swift and Molière—an honour I could not have given myself. I would also advise Mr. Prater that "suggesting a few to other persons" is not the next best thing to making experiments oneself; for I myself, "without even knowing the very rudiments of chemistry or physiology," could *suggest* experiments which would not be so easily *made*; for instance, the decomposition of sound by a prism of collodion film filled with carbonic acid. If every tyro in science were to amuse himself in the same manner, the practical man would soon be a matter of history.

Your space, Gentlemen, is too valuable to be taken up by more of this; allow me to wind up by asking Mr. Prater the meaning of the last sentence of his first paragraph; for I never wrote a book; and he says, "no men of sense would dream of reading *him*," and yet he seems to have read the former letter of,

Gentlemen, yours, &c.,
F. H. H.

METHOD OF TELEGRAPHING.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I fully agree with the clear-headed remarks of Mr. Allan, in last Saturday's *Mechanics' Magazine*, and I further think the method of telegraphing which I hinted at a few months since in the *Mechanics' Magazine*, would meet all the requirements of the case.

It consists of an india-rubber tube, connected at each end with small metallic cylinders, to which are attached scales, one containing the letters of the alphabet in a direct order, as A B C, the other in a reverse order, as Z Y X. These cylinders are to be

fitted with pistons, each carrying an index corresponding with its respective scale. Now, if the tube be filled with water, on pressing the piston in either cylinder till its index stands at any given letter, the index on the other scale will instantly stand at the same letter; hence, the words of any message can be spelt off with facility. There are several minor details which I need not mention, but I hope I have made the principle sufficiently apparent.

I am, Gentlemen, yours, &c.,

WM. CARROLL, Blacksmith.

Openshaw, Manchester, Sept. 6, 1857.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

MOREL, J. *Improvements in castors for fitting under the feet of tables, seats, and other similar pieces of household goods.* Dated Dec. 27, 1856. (No. 3085.)

A roller or wheel is made of hard material. A small metallic cylinder passes through the roller, in which is inserted an axle pin taking into the sides of, and turning freely in, a spherical hollow ball or globe, which latter is made fast to a disc by rivets. A pin in the centre of the disc rivetted into it is let in the centre of the leg of the table or other article of furniture, and an iron washer, applied under the leg between a shoulder of the pin and a boss of the disc, allows the latter to revolve freely around the central pin.

BOWDITCH, W. R. *Improvements in the manufacture of a compound to be used as a varnish for water colours, and as a carrier for water colours or paints.* Dated Dec. 29, 1856. (No. 3086.)

The patentee takes of milk 1 gall., of hard soap 2 lb., and common alum 1½ lb. The soap is sliced thin and put into the milk, which is heated to about 120° Fahr., and the mixture is stirred until the soap is dissolved. The alum is dissolved in the smallest quantity of water possible, and is then added to the mixture of soap and milk, and thoroughly incorporated by stirring. The mass is next ground fine in a colour mill. When ground the semi-fluid mass is washed with water until the wash water hardly reddens blue litmus paper. It is then left at rest until the water at the top is clear, and this is run off. More water is then added, the whole mixed, left to settle, and the clear fluid drawn off. This is repeated until the clear water on the top of the thick white mass hardly affects blue litmus paper.

VAUGHN, H. *An improved method of hardening and tempering steel, and of hardening cast and wrought iron.* Dated Dec. 29, 1856. (No. 3087.)

This consists in heating the articles to be hardened and tempered in a bath composed of certain chemical agents in a state of igneous fusion, from which both the articles to be hardened and tempered are removed when sufficiently heated and dipped into water, oil, or certain solutions in the usual manner. The chemical agents required consist of 2 lbs. of bichromate of potash, 12 lbs. of chloride of sodium, and 4 lbs. of prussiate of potash.

WELLS, J. H. G. *Improvements in pumps, and valves used therewith.* (A communication.) Dated Dec. 29, 1856. (No. 3088.)

This is especially adapted to ships, &c., and consists—1. In retaining the pump always ready to work. 2. In the construction of the valves, as well as keeping them always in the liquid. 3. In preventing any possible obstruction in the working of the pump.

ALDEN, T. *Setting and distributing printing types.* Dated Dec. 29, 1856. (No. 3089.)

See *Mechanics' Magazine*, No. 1769, p. 14.

SPEED, J. J., jun., and J. A. BAILEY. *Improvements in the manufacture of seamless pipes and tubes.* Dated Dec. 29, 1856. (No. 3090.)

This invention consists of certain machinery for the above purpose, which cannot be described without engravings.

GILBEE, W. A. *Improvements in treating beet-root for the manufacture of vinegar.* (A communication.) Dated Dec. 30, 1856. (No. 3091.)

This consists—1. In treating beet-root for the production of the vinous liquid. 2. In converting the vinous liquid and vinegar. The patentee first describes at great length the present modes of making vinegar, then the mode in which he makes the vinous liquid from beet-root, and then how he converts the vinous liquid into vinegar.

GRAINVILLE, J. L. C. LE F. DE. *Certain improvements in heating apparatus.* Dated Dec. 30, 1856. (No. 3092.)

This consists in the application to ordinary fireplaces of an apparatus (which cannot be described without engravings) for economizing the heat, and for warming and preventing the entrance of the smoke into the apartment.

NEWTON, W. E. *Improved means of preventing the explosion of steam boilers.* (A communication.) Dated Dec. 30, 1856. (No. 3093.)

The object is to prevent explosion resulting from a deficiency of water. The object is effected by the employment of a fusible valve or stopper attached to a tube or pipe communicating with the inside of the steam boiler. Immediately the fusible metal is uncovered, by the water sinking, it will be

melted, and an opening will be made into the tube to which it is attached, and the steam allowed to escape from the boiler.

BROOMAN, R. A. *Improvements in the construction of portable houses and other buildings.* (A communication.) Dated Dec. 30, 1856. (No. 3094.)

This consists in a method of combining the parts of houses, &c., in such manner that they may be readily erected, taken to pieces, and as readily re-erected.

BROOMAN, R. A. *Improvements in manufacturing articles of earthenware and other ceramic materials, and in the machinery and apparatus employed therein.* (A communication.) Dated Dec. 30, 1856. (No. 3097.)

This consists in a method of, and machinery for, moulding articles of earthenware in which a reciprocating action templet-carrier or counter-mould and a revolving matrix or mould carrier are employed. And further in the employment of expansible counter-moulds, applicable for moulding articles with curved or belly sides.

BRAY, W. *Improvements in traction engines.* Dated Dec. 31, 1856. (No. 3102.)

The patentee constructs the wheels with teeth or blades which enter the ground and obtain a firm hold. These teeth are made to slide or move in and out by an eccentric or other means, so that they clear themselves of the soil, and are again ready to enter the ground.

WILLIAMS, C. W. *Improvements in apparatus for mechanically charging furnaces with fuel.* Dated Dec. 31, 1856. (No. 3103.)

This invention was described and illustrated at page 152, of No. 1775.

PITMAN, J. T. *A machine for making carpet lining and other similar articles.* (A communication.) Dated Jan. 1, 1857. (No. 1.)

This consists in operating by mechanical means two rollers containing sheets of paper or fabric rolled thereon, so arranged in relation to a sheet of cotton, batting, or other suitable material, that when the paper sheets are unrolled they shall encase between them the bottom sheets; also in compressing between another set of rolls this combination as it moves onward, the cotton sheet resting on the lower or under sheet as upon an apron; also in a mode of folding and measuring the same; also in the construction of a platform on which the lining falls; also in the arrangement of an apparatus for sizeing, when required, the inner side of the paper sheets, in order to render the combination more perfect by the consequent adhesion.

REINHADT, C. C. *An improvement in the manner of fastening metallic backs to truss pads of glass, porcelain, or other analogous substances.* Dated Jan. 1, 1857. (No. 2.)

This consists in the attachment of metallic backs to the glass or porcelain faces of truss pads, by a flange around the edge of the back slipping within the rim constituting the edge of the glass or porcelain face-piece.

RIGBY, W. *Improvements in machinery or apparatus for engraving metallic cylinders or rollers employed for printing calico and other substances.* Dated Jan. 1, 1857. (No. 3.)

This consists of improvements on a patent of the patentee dated 7th April, 1854. He now finds it practicable to use more than one line of tools on the same machine; and employs an improved construction of the tool carriage for effecting that object, and also the use of more tool bars than one.

NOUALHIER, E. T., and J. B. PREVOST. *Improvements in applying metals over hard vitrified or any other surfaces by galvanoplastic process.* Dated Jan. 1, 1857. (No. 5.)

If the object to be treated be a china vessel, that part of it which is to receive the coating of metal is covered with a layer of varnish, or of gold size, and when the varnish is dry, copper leaf is applied to it. All dust is then removed from the surface, and the vessel placed into a bath containing a solution of sulphate of copper. By the action of a galvanic battery a deposit of copper takes place, and the vessel is taken out of the bath, cleaned and smoothed by filing off the asperities, and finished with pumice stone to be finally polished as required. This coppering may be effected by making use in a certain way of German gold dust or bronze powder containing much mercury. This invention also comprises the method of coating corpses as described at page 35 of No. 1770.

MABERLY, F. H. *Improvements in the construction of wheeled carriages.* Dated Jan. 1, 1857. (No. 7.)

Omnibuses constructed on the principle of the patentee have the under wheels let in under the body of the vehicle in places made for their reception, the body being placed considerably lower than otherwise; and if the doors are on the sides of the omnibus, and open the contrary way to what is commonly the case, the same may be entered by a single step without fear of injury or of dirt from the wheels.

AYCKBOURN, F. *Improvements in stockings for personal wear.* Dated Jan. 1, 1857. (No. 8.)

The patentee works a circuitous band round the stocking about an inch wide, somewhat resembling a garter in appearance, and afterwards, by the application of loopwork applied manually to the interior

surface of the stocking upon that part only, he deprives the band of a portion of its elasticity, to enable the stocking to support itself on the leg without a garter.

STOTT, F. S. *Improvements in slide valves applicable to steam and other motive power engines.* Dated Jan. 1, 1857. (No. 9.)

This consists in the application of a metallic ring or rings, plates or packings between the back of the valve, and the lid or cover of the steam case or valve box so fitted and secured and capable of adjustment as to fill up the space, yet allowing the valve to slide freely, thus preventing the steam from pressing upon the back of the valve. The patentee also forms slide valves in two or more parts, which can be set and secured on the valve spindle by nuts and screws, so that he is enabled to regulate the lap or cover to the greatest nicety: he also proposes to pass the exhaust steam through the back of the valve, and thence through the aforesaid ring, plate, or packing, and lid or cover, or he reverses the action, and admits the steam there.

LORIMIER, A. *An improvement in preparing the surfaces of printers' inking rollers and other articles when vulcanized India-rubber is used.* Dated Jan. 1, 1857. (No. 10.)

This consists in subjecting the surfaces to heat so as partially to melt the same, and thereby improve them. The most convenient mode is by causing heat to pass over such surfaces.

PHILLIPS, W. H. *Improvements in stereoscopes.* Dated Jan. 1, 1857. (No. 11.)

The frame or case of a stereoscope is made in two parts, hinged near the base of each, in such manner that the eye pieces may be brought to, or moved from, each other with facility to accommodate different sights. The lenses and eye pieces are each mounted on a tube produced by winding a plate or strip of metal spirally, and moved by a screw. The picture is arranged to be seen through openings of another photographic picture representing a frame or curtain or other suitable device.

FOWLER, J., jun. *Improvements in giving motion to ploughs and other agricultural implements.* Dated Jan. 1, 1857. (No. 12.)

This invention consists—1. In mounting capstans or drums on separate axes placed at an angle to each other. 2. In moving the pulley anchors along the headlands, by the power of the engine acting through the same rope as that which draws the plough. 3. In a method of supporting and carrying the rope by which the plough is drawn, so as to prevent the rapid wear of the tackle which takes place when the rope lays on the land.

GEORGES, E. V, J. L. *Improvements in preserving animal substances for food.* Dated Jan. 1, 1857. (No. 14.)

This consists in extracting from the substances all the fermentable gases which they may contain. The patentee encloses them in a porous covering pervious to air, composed of linen, sand, plants, earth, sawdust, &c., and places them in a basket of wire gauze into the interior of an oven. The whole is then dried.

HOUSE, J. *Improvements in concentrating and preserving milk and other liquid articles of food.* Dated Jan. 1, 1857. (No. 15.)

The object here is to construct the apparatus so that it may be worked by steam power, thereby dispensing, to a great extent, with manual labour.

PETTIGREW, J. *Improvements in the manufacture of bread.* Dated Jan. 2, 1857. (No. 18.)

This relates—1. To the manufacture of dough or paste. 2. To the rolling and cutting or severing such dough or paste into masses of the dimensions required for the individual articles to be subsequently made therefrom, suitable machinery being employed for both purposes.

SZERELMEY, N. C. *Improvements in preparing combinations of materials for rendering walls and other structures waterproof.* Dated Jan. 2, 1857. (No. 23.)

These improved "Greek cements" are produced thus:—The patentee takes water, blood, ground bricks, powdered copper slag, powdered iron slag, argillaceous earth, and gaseous matter produced from milk. These are boiled together, and is called compound No. 1. In a second compound are employed gas or coal tar (or linseed oil, or rosin, or asphalte), hydraulic lime, grit, and calcined flint. These are boiled, and are then, by an iron ladle, transferred to a second iron pot. So that the air may come freely in contact, and after the mixture has cooled, it is again boiled until it spontaneously bursts into combustion, and after it has burned a very short time the fire is extinguished by a close fitting cover. This preparation is called No. 2. These cements, though capable of separate use, are preferred to be employed in succession on walls or other structures.

HARRIS, J. *Improvements in obtaining and transmitting motive power.* Dated Jan. 2, 1857. (No. 25.)

This consists in obtaining and transmitting motive power by the combination of a steam engine or other prime mover, and of another engine to be worked by compressed air or gas. The steam engine, or other prime mover, is employed to compress air or other gas, and transmit it through suitable pipes and connections to an air engine. The object is to transmit or supply power

for all purposes where it may be impracticable, difficult, or dangerous, to apply the power direct by means of steam engine, water wheel, or other prime mover.

WATKINS, L. W. *The manufacture of a composition, commonly known as putty, to be used in glazing and other purposes.* Dated Jan. 3, 1857. (No. 28.)

The improved putty is a composition of 2 parts of an oil obtained in the refining of rape and linseed oils, and commonly known as black acid oil, from its containing sulphuric acid, which acid is used in the refining of the said oils, added to 1 part of any alkali in solution, and mixed with it in a vessel until by continual stirring it assumes a creamy or soapy appearance. It is then mixed by hand labour, or any other mechanical force, with a sufficient quantity of whiting, until it attains the consistency of dough, when it is termed putty.

NEWTON, W. E. *Certain improvements in the means of connecting, accumulating, retaining, and applying reserved power for the application of railway breaks in sudden emergencies.* (A communication.) Dated Jan 3, 1857. (No. 30.)

This consists in peculiar means of connecting, accumulating, retaining, and applying the reserved power directly to, and in combination with, a revolving break shaft that is employed for the purpose of applying power to the breaks by hand. Reference to engravings is essential to a description of this invention.

CROLL, A. A. *Improvements in the manufacture of coal gas.* Dated Jan. 3, 1857. (No. 31.)

These consist in supplying the coal, so that it may be distributed in thin layers in the retorts, to facilitate rapidity of operation. The patentee prefers to have the coal reduced to small particles, and to keep up an uniform supply by the application of self-feeding apparatus to the retorts in place of the ordinary mode; and he effects the distribution of the coal in the retorts by inclining the retorts, or by means of distributors.

BROOMAN, R. A. *Improvements in winding, twisting, and doubling fibrous materials, in the machinery employed therein, and in the mode of driving the same, parts of which improvements are applicable to the communicating of rotary motion to other machinery.* (A communication.) Dated Jan. 3, 1857. (No. 32.)

This has reference—1. To the whorls, wharves, or pulleys of spindles, and consists in forming them conical or of double conical frustrums, and in passing the driving band or cord once, twice, or thrice completely round their peripheries. 2. To the drums employed to actuate such bobbin or flyer spindles, and consists in forming them like the wharves. 3. To winding yarn to be twisted, &c., twice or more times round the upper pressure cylinders of throstle frames, &c., before delivering it to the bobbins or flyers, and further in constructing such upper pressure cylinders of a number of separate rollers, each having toothed gearing, by means of which the rollers are thrown in and out of gear with fixed teeth on the lower cylinder. The invention further consists in doubling yarn, &c., or giving it the second twist in a dry state, and in carrying the threads or fibres in an oblique direction from the pressure cylinders to the bobbins or flyers.

BINKS, C. *Improvements in treating ore in the manufacture of iron, and in obtaining products therefrom.* Dated Jan. 3, 1857. (No. 33.)

The objects here are to effect among the materials present in and through the operations of the blast furnace (when applied to the reduction of iron ores) the production of certain cyanogen compounds simultaneously or conjointly with the reduction of the ore and the purification of the metal and of the fuel; in other words, to effect the removal from the metal of certain impurities contained in the ore itself, or to prevent certain impurities contained in the fuel from being taken up by the metal in the process of reduction, and so to conduct those reducing and purifying operations, that there shall be obtained concurrently and as special products of the operations of the furnaces, certain cyanogen compounds to be applied to other industrial purposes. And the invention consists in the employment of alkaline matter in addition in some instances, but in others in place of lime, or of silica, or of other fluxing materials that are commonly used to aid the reduction of the ore and the purification of the metal.

BINKS, C. *Improvements in obtaining certain compounds of cyanogen.* Dated Jan. 3, 1857. (No. 34.)

The primary object here is to effect the conversion of an alkali, of an alkaline carbonate, or of an alkaline carburet, or of any elements yielding these or one or other of them, into a cyanide or cyanuret suitable for being used for various industrial purposes, or for the preparation of other compounds. And the invention consists—1. In placing the materials—the alkaline matter, or the materials for yielding the alkaline matter—along with the proportion of associated carbon, and the fuel needed to give the requisite temperature to the mixture, in a cupola, blast, or other furnace in which a high temperature under the action of a blast of atmospheric air is applied to effect the reduction of the alkali, and through the

combination with the nitrogen of the air and some of the excess of carbon present, its transformation into a cyanide. 2. In the application of one or other of certain kinds of furnaces or apparatus in which to effect the same objects in the formation of alkaline cyanides. 3. In combining or mixing with the alkali, or the alkali yielding materials, and the carbon or carbon yielding materials, as above described, coprolites or bones, or other phosphates of lime, or materials containing and capable of yielding phosphorus, and in exposing such mixture to a high temperature, and the conjoint action of nitrogen derived from or in form of deoxidised atmospheric air, and an excess of carbon.

FORSYTH, T. *Improvements in locomotive and other steam engines.* Dated Jan. 5, 1857. (No. 35.)

This consists—1. In placing the valve and the ports of steam engines in a diagonal position, instead of at right angles, to the direction of the traverse of the valve. 2. In making the exhaust steam escape from both ends of the exhaust port into the exhaust or blast pipe. 3. In an improved metallic piston. 4. In an improved mode of constructing the packings or wearing rings or segments of metallic pistons. 5. In an improved stop-piece for pistons. 6. In an improved feed-water heating apparatus. 7. In an improved blast regulator; and 8. In enclosing the cylinders of outside cylinder locomotive engines within the smoke box, and causing the hot products of combustion to circulate around the cylinders of locomotive engines in passing to the chimney.

INGHAM, J., E., and B. *Improvements in apparatus employed in finishing textile fabrics.* Dated Jan. 5, 1857. (No. 36.)

This relates to "pressing," and consists in constructing the hollow press plates employed in this process, by forging together two sheets or plates of iron, either with or without an intermediate marginal piece or rim of similar material, thus forming a cavity or space betwixt the two plates, and by placing blocks or pillars at intervals within the space for support. This press plate will be quickly heated or cooled by the admission of any suitable heating or cooling media. And for supplying the heating or cooling media to these plates the patentees employ wrought iron tubing or gas piping capable of bending to allow for the variation of position of such press plates.

BRUNDISH, A. *Improvements in mounting knobs, and in constructing and mounting roses for locks, latches, and other like fastenings.* Dated Jan. 5, 1857. (No. 37.)

This invention cannot be described without engravings.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

BROOMAN, R. A. *Improvements in lifting jacks.* (A communication.) Dated Dec. 30, 1856. (No. 3095.)

This consists in substituting for the teeth of the main shaft of the jack a screw threaded shaft, and a nut with screw thread on the inside with a worm outside driven by an endless screw or worm; in communicating motion to the worm by a handle which may be used as a ratchet lever or as a crank; and in mounting the jack upon a bed on which it may be made to travel by a screw.

BROOMAN, R. A. *An improvement in sawing machinery.* (A communication.) Dated Dec. 30, 1856. (No. 3096.)

This consists in the combined employment of a locomotive steam engine, and of one or more rotary saws, saw blades, or band saws, &c.

SHAW, G. A. *An improved machine for thrashing and cleansing corn or grain.* (A communication.) Dated Dec. 30, 1856. (No. 3098.)

This consists in the employment of a revolving fan having upon every blade, or alternate blades, a number of beaters, hinged so as to act as flails.

LANE, J. *Certain improvements in jacquard looms.* (A communication.) Dated Dec. 31, 1856. (No. 3099.)

This consists in the application of a perforated drum and other mechanism to the jacquard machine by means of which the pattern or design is wrought without the use of the ordinary perforated "cards."

HENRY, J. O. *Certain improvements in the production of embossed surfaces on wood.* Dated Dec. 31, 1856. (No. 3100.)

This consists in employing thin sheets of wood to obtain embossed impressions by means of the stamping press and pressing rollers.

MADDEN, P. *Improvements in furnaces or fire-places applicable to such in use for either heating of drying-kilns, roasting of substances, or heating of boilers.* Dated Dec. 31, 1856. (No. 3101.)

The inventor proposes to place either metallic plates or metallic tubes, or both conjointly, near the fire, in such positions as that the plates or tubes shall be subject to the free action of the fire upon them, and so that the heat shall pass over or between the plates, or through the tubes, in their progress to the kiln, &c.

TERRY, A. R. *Improvements in machinery for cutting sugar and other substances.* Dated Dec. 31, 1856. (No. 3104.)

The object is to connect and move certain cutting edges, so that the sugar shall be reduced into lumps of any desired size. The inventor works two different cutters at right

angles to each other, and attaches to the last a series of smaller cutters.

McCulloch, W., and T. Kennedy. *Improvements in stop cocks or valves.* Dated Dec. 31, 1856. (No. 3105.)

This relates to a peculiar construction of stop cocks or valves for the regulation of the flow of water, steam, &c. It requires an engraving to illustrate its construction.

Mann, W. C., and F. J. Ingram. *An improved mode of embossing cloth or other fabrics.* Dated Dec. 31, 1856. (No. 3106.)

The press consists of a double box to which pressure may be applied by means of a screw or lever on the principle of a letter-copying press. Into the lower box red hot heaters are put, and in the upper box the engraved cast or otherwise patterned plates are placed. When these are warm the cloth or other fabric is to be placed on the plate and pressure applied, when embossed impressions will be obtained.

Bourne, J. *An improved steam train for navigating shallow rivers.* Dated Jan. 1, 1857. (No. 4.)

This train is composed of a steamer and train of barges articulated to one another by circular joints, so as to admit of lateral and vertical deflection. The vessels of the train are made with their ends convex or concave, and each convex end fits into a corresponding concave end.

Smith, J., and H. Wiseman. *Improvements in shutters for shop fronts, and in apparatus connected therewith.* Dated Jan. 1, 1857. (No. 6.)

This consists in applying rollers at the upper and lower ends of shutters of the usual construction to enable them to be slidden with facility in suitable grooves, and in providing a moveable box into and from which the shutters are slided when taken down and put up respectively.

Lawrance, W. *An improved chimney cap or cowl and ventilator.* Dated Jan. 1, 1857. (No. 13.)

This consists in covering the top of a chimney shaft, pipe, or flue, with a conical deflector or plate having an orifice in the centre, and in connecting to the chimney, shaft, pipe, or flue, a cylinder or piece of pipe open at top and bottom, so that the lower edge of the cylinder shall descend below the level of the top of or opening in the conical deflector. A pipe covered with the deflector and fitted with the cylinder forms a ventilator, which can be fixed over apertures in the roof of churches, &c.

McLennan, J., and J. and J. H. Palmer. *An economical gas light generator and consumer.* Dated Jan. 2, 1857. (No. 16.)

This consists in causing the gas light to expand or be drawn out, by placing upon the top of the glass a small dome, fastened to the glass, providing sufficient space for the admission of air.

Wilson, J. *Improvements in the manufacture of steel.* Dated Jan. 2, 1857. (No. 17.)

These consist in roasting or calcining granulated cast iron, and afterwards melting the roasted metal to obtain cast steel. Also in obtaining steel from rich iron ores by substituting such ores in place of bar iron in the usual process of cementation to obtain steel, and in melting the product so obtained with from 6 to 8 per cent. of oxide of manganese to obtain cast steel.

Johnson, J. H. *Improvements in apparatus for roasting meat.* (A communication.) Dated Jan. 2, 1857. (No. 29.)

This consists in constructing apparatus so that the rotary motion of the spit will impart a reciprocating movement to a basting ladle, by which means the meat is kept constantly well basted, so long as the spit is in operation.

Johnson, J. H. *Improvements in pressure gauges.* (A communication.) Dated Jan. 2, 1857. (No. 20.)

This relates to several arrangements of pressure gauges for indicating the pressure of steam and fluids, whether above or below that of the atmosphere. According to one arrangement of gauge a combination of a piston and flexible diaphragm is employed, the piston being connected in an adjustable manner with a bow or hoop spring to counterbalance the steam or fluid pressure which is exerted against the opposite end of the piston.

Gras, A. *Improvements in obtaining motive power.* Dated Jan. 2, 1857. (No. 21.)

The inventor obtains motive power by means of a steam-engine forcing air by a suitable air-pump into a reservoir. This reservoir is connected with a worm or coil of tubes placed in the furnace of the steam-engine boiler. The air is admitted to the coil by means of a suitable cock or valve. It becomes heated and highly elastic in the coil, whence it passes to an air-engine from which the power is derived.

Baird, J. *Improvements in planting potatoes.* Dated Jan. 2, 1857. (No. 22.)

This consists in combining apparatus suitable for making furrows, and for depositing pieces of potato at suitable intervals apart in such furrows, and then to cover in such furrows. For these purposes a suitable frame is constructed, and at the fore part thereof one or more shares or ploughs, according as one or more furrows are to be produced, are attached. Behind each of such ploughs there is a rotating apparatus, carried by the axle of the two side wheels of the machine.

Turner, J. *Improvements in oscillating*

cylinder steam engines. Dated Jan. 1, 1857. (No. 24.)

This relates to modifications of the oscillating engine. The trunnions on which the cylinder oscillates are advanced to near the head of the cylinder, in order more completely to balance the weight of the cylinder and its connections. To reduce the oscillating movement the inventor uses a long piston rod for transmitting the reciprocating motion of the piston to the crank shaft, and also a long guide, which is carried by the cylinder head, and steadies the movement of the rod. The valve is placed at the side of the cylinder, and worked by a rod leading direct to an eccentric on the crank shaft.

BROOMAN, R. A. *Certain improvements in rotary steam engines.* (A communication.) Dated Jan. 2, 1857. (No. 26.)

This consists in the construction of a rotary engine in which the centre is open, the steam being admitted into an annular chamber, and acting upon one piston only fixed upon a wheel keyed to a shaft, through which power is transmitted; and in causing the stop or abutment to rise and allow passage to the piston, and fall immediately after its passage by steam let into a supplementary cylinder at the proper moment by suitable gear worked by the engine and connected to slide valves, &c.

BROOMAN, R. A. *An improved steam engine.* (A communication.) Dated Jan. 2, 1857. (No. 27.)

This consists in causing steam to act upon a pendulum to make it vibrate, and in communicating power to a crank through a connecting rod affixed to the shaft of a pendulum, &c.

FERRO, F. *The manufacture of paper from a vegetable or herb that grows in the Isle of Sardinia and Spain, and which he proposes to call Ferus paper.* Dated Jan. 3, 1857. (No. 29.)

The above vegetable is put into a steam copper for 4 hours with a small quantity of potash, for getting rid of the gummous substance it contains, reserving the fibrous parts. It is then taken out, the contents put under a large vertical stone wheel or iron cylinder, for compressing and working it, at the same time reducing it to a state of tow. It is next reduced to pulp, and from this pulp packing paper is produced, and whilst reducing it to pulp it is washed well with potash and water for getting rid of the colouring matter. This pulp produces white paper. In the next process chloride of lime is used with common salt. From this pulp writing paper is produced. The rest of the process is similar to all paper making.

JOWETT, H. A. *Improvements in steam engines.* Dated Jan. 5, 1857. (No. 38.)

The inventor proposes to construct a rotary engine thus:—He makes a cylinder with a plain flange top and bottom, and bored out perfectly true, and places in it a parallel drum much smaller than the cylinder, but the whole depth of it. Upon each end of this drum a flange is cast, the edges of which are turned true to fit the bored part of the cylinder. Between these flanges and the whole depth of the cylinder is fixed a solid piece of metal, about one inch thick, secured steam tight upon the periphery of the drum, and level with the edges of the flange, working steam-tight in the cylinder. In the sides of the cylinder are cut opposite each other two slots the whole length of the cylinder, through which slots move in and out two segmental pieces which come against the drum and make a steam-tight joint, moving back to allow the arm to pass.

BRAITHWAITE, F. *An improved mode of extracting the iron from tin ores.* Dated Jan. 5, 1857. (No. 39.)

This consists in separating the iron contained in tin ores by the aid of magnets.

PROVISIONAL PROTECTION.

Dated August 5, 1857.

2172. James Joseph Cardin, of Orange-street, Red Lion-square, gentleman. Improvements in brakes for omnibuses.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," September 8, 1857.*)

1167. S. Sunderland and R. Dean. Improvements in looms.

1183. E. F. Barnes. Improvements in telegraphic instruments, and called an "embossing telegraph."

1188 W. Levesley. Improvements in manufacturing the blanks of forks, scissors, cutlery, chisels, and other tools, which improvements are applicable to the manufacture of springs for pocket knives and other like articles, now prepared by the forging process.

1198. J. Ramsbottom and J. Bailey. Improvements in regulating the flow and pressure of liquids and fluids.

1202. C. Pascall. Improvements in tile making machinery.

1211. F. Walton. Certain improvements in the manufacture of plastic compositions.

1212. F. Walton. Improvements in the manufacture of wire cards for metallic brushes, and for carding fibrous substances, and in the machinery employed therein.

1220. C. Cammell. Improvements in the manufacture of axles or axletrees for railway carriages, and shafts for various purposes.

1229. E. Hawkes. New or improved machinery for the manufacture of pipes for smoking.

1235. E. Tucker. Improvements in the manufacture of starch.

1242. J. S. Greenhow. An improvement in alarum apparatus when using electric currents.

1249. T. J. Cooke. Improvements in the ma-

nufacture of knobs, roses and escutcheons used for doors, drawers, shutters, and other similar purposes.

1252. J. Stanley. Improvements in the construction and mode of applying cranes and other hoisting machines to hoisting, suspending, lowering, and weighing purposes, also in generating, transmitting, and applying motive power for the same.

1276. B. Hingley and S. Hingley. Improvements in anchors.

1294. C. T. Bright and C. De Bergue. Improvements in apparatus to be employed in the laying or sinking of submarine telegraph cables.

1300. W. C. Cambridge. Improved machinery for winnowing corn and separating seeds.

1304. T. Lipkau. An improved antisyphilitic compound.

1317. R. Wilson. Improvements in machinery or apparatus for raising or forcing fluids.

1354. M. Henry. Improvements in winding weft and in the machinery employed therein, part of which is applicable to spinning machinery. A communication.

1379. S. Sands. Improvements in the manufacture of fringes. A communication.

1403. C. Reeves. New or improved grinding and polishing machinery to be used in the manufacture of knives, matchets, swords, and other similar articles.

1438. J. W. Hackworth. Improvements in machinery or apparatus for forcing, lifting, and exhausting aëriform bodies and liquids applicable to blast furnaces.

1470. J. Crossley. Improvements in machinery for grinding and smoothing glass, marble, and other substances.

1563. S. Morand. Improvements in apparatus used for stretching and drying fabrics.

1638. D. J. Daly. Improvements in venting casks and in preserving them from bursting by the action of the liquors contained therein.

1949. W. E. Newton. An improved mode of preventing incrustations in steam boilers. A communication.

1954. H. Hebblethwaite, W. Shuttleworth, and W. Tasker. Improvements in preparing yarns for, and machinery or apparatus employed in printing yarns for carpets, or other similar fabrics.

2000. R. A. Brooman. Improvements in the manufacture of pipes and tubes. A communication.

2011. A. Scott. Improvements in stops for gates and doors.

2096. W. Hopkinson. Certain improvements in steam engines.

2128. D. J. Crossley. Improvements in the treatment of certain textile fabrics called "pellones," and used for saddle covers, and in the machinery or apparatus for effecting the same.

2168. F. Lipscombe. Improvements in the mode of diverting the London sewage from the River Thames and in discharging it into the sea.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1928. George Mackay Miller.
1937. William Brownfoot.
1945. James Eden.
1958. James Burns.
2005. George Frederick Evans and Frederick John Evans.
2019. William Henry Dawes.
2063. Henri Catherine Camille de Ruolz and Anselm Louis Maire de Fontenay.
2070. Thomas Clayton and Robert Harrop.
2084. Alfred Vincent Newton.

LIST OF SEALED PATENTS.

Sealed September 3, 1857.

619. John Banks.
620. William Leuchars.
622. Edward Lindner.
627. William Taylor.
638. James Stephens.
645. Hugh Greaves.
650. Thomas Jefferson Thompson.
652. William Edward Newton.
653. James Kinder Cheetham and Thomas Southworth.
655. Richard Atkinson Coward.
661. William Petrie.
666. George Hawksley.
672. Richard Archibald Brooman.
686. Carl Heinrich Julius Wilhelm Maximilian Liebmann.
689. Alfred Vincent Newton.
692. William Henry Barlow and James Samuel.
702. Robert Lewis Jones.
720. Emanuel Berger and Jules Edouard Matile.
722. William Ramsey Nevins and Joseph John Yates.
730. Joseph Pimlott Oates.
732. Henry Bradley and Elmit Wray.
738. Henry Martin.
782. Charles Weiss, Henry Lister, and John Mitchell.
783. John Parker.
785. John P. Jourda.
788. Isaac Atkin and Marmaduke Miller.
837. William Somervail.
858. Edmund Alexander Spurr.
902. William Smith.
934. John Henry Johnson.
938. George Spencer.
950. John Henry Johnson.
994. Alfred Vincent Newton.
999. John Atherton Molineaux.
1172. William Edward Newton.
1195. William Armand Gilbee.
1268. Louis le Chevalier Cottam.
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1375. Isaac and William Whitesmith.
1377. David Carter.
1448. Benjamin Hornbuckle Hine and William Onion.
1479. William Edward Newton.
1480. Robert James Hendrie, jun.
1535. George Hornsey.
1538. Lazare Prosper Lambert-Alexandre and Louis Pierre Felix Mallet.
1608. Isaac and William Whitesmith.
1662. Chapman March.
1680. James Cocker.
1699. Alfred Vincent Newton.
1720. Robert Rennie.
1873. Frank Clarke Hills.

Sealed September 8, 1857.

675. Clement Sharp.
677. Frederick Shand Hemming.
679. George Davies.
681. Samuel Faulkner.
682. Edward Cook and James Stokes.
683. Henry Richard Smith.
684. Frederick Simpson.
691. Andrew Knox and Thomas Robson.
694. Frederick Alexander Fitton.

695. James Edward Duyck.
699. Charles Reynaud.
700. James Hamilton.
701. Charles Baylis.
711. Joseph Jules Derriey.
729. Henry Bridges.
734. George Marshall.
737. Henry Glaysher.
740. Jules Moes.
775. William Gwillim Merrett.
778. Joseph François Maire.
824. Samuel Fox.
912. François Auguste Lauredisque.
1164. Matthew Smith.
1262. Edward Davis.
1452. Anton de Schuttenbach.
1494. James Savory.
1822. Gustav Adolph Buchholz.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

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No. 1780.] SATURDAY, SEPTEMBER 19, 1857. [PRICE 3D.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

GUÉRIN'S SELF-ACTING RAILWAY BRAKE.

Fig. 1.

Fig. 2.

GUÉRIN'S SELF-ACTING RAILWAY BRAKE.

An active effort is now being made to introduce upon the railways of this country an improved self-acting railway brake, the invention of M. Guérin. This brake has been used, it is said, with much success abroad, and a report of a very laudatory character has been presented to the French Minister of Public Works. It is represented by the annexed engravings, of which fig. 1 is a side view; fig. 2 a plan; and fig 3 a transverse section of a carriage or waggon under frame, with the self-acting brake attached. Fig. 4 is a series of views, in different positions, of the centrifugal apparatus H, attached to the axle. In the brakes generally used on railways, the pressure of the friction-shoes against the wheels is produced by means of a handle worked by the guard or brakesman of the train. In the system of M. Guérin, the object is to work the brakes by the pressure exerted on the buffer-springs at the time the driver shuts off the steam and screws up the tender-brake, in order to stop the train. This result is obtained by placing on the brake-spindle a lever marked *a*, the end of which rests against the middle of the hind buffer-spring T of the waggon. When the buffers are pressed in, this spring moves with them, carrying forward the end of the lever *a*, and thus throwing the brake into action. It is necessary, however, to observe that when a train is shunted backwards (an operation which would, of course, also press in the buffers) the brake ought not to act. This condition, essential for a self-acting mechanism, has hitherto presented serious difficulties; but they have been overcome in the present apparatus by the following means:—*b*, is a forked piece, or bent lever, attached to the hind cross-beam of the frame, and jointed in such a way that when its horizontal arm is lowered it serves as a stop or strut to the shoulder of the draw-hook, and prevents it sliding forward. When, however, this arm is raised, the hook and its accompanying draw-bar are free to move in the ordinary way; *c*, is a vertical lever hung to the frame, and provided with a counterweight, *d*. This lever communicates motion, by means of a rod, *e*, to the forked piece, *b*. H, is a collar or ring of peculiar form, attached to one of the main axles of the waggon by two pivots on which it swings. When the axle attains a certain velocity, the position of this collar changes under the influence of centrifugal force. The lever, *c*, rests against the greater circumference of this collar until said velocity is attained. When the train is running, the centrifugal collar, H, takes the position shown in the left hand-figure of fig. 4, and presents its smaller diameter to the lever, *c*, which, when in this position, raises the forked piece, *b*, disengaging it from the shoulder of the draw-hook, and thus allowing the buffer-spring to move and bring the brake into action. To avoid friction, the lever, *c*, does not then touch H, but hangs free in the groove or lesser circumference of H. On the contrary, when the train is at rest, the centrifugal collar is brought, by two springs, into the position of the *right hand* figure (fig. 4), and in this position presents to the lever, *c*, a larger diameter. The consequence of this is that the arm of the forked piece, *b*, is lowered and inserted between the carriage-frame and the shoulder of the draw-hook, and thereby prevents that motion of the buffer-spring which is necessary to put the brake into action. The spring is thus at liberty to perform freely its ordinary function of buffing, without exerting any influence on the brake; and it is evident that in this way the train may be backed without the brake acting; *r r*, is a spring, named a *recoiling-spring*, which acts by means of a rod, *g*, on the draw rod; its object being to bring back the buffer-spring to its place and to release the brake. It also prevents the brake acting under a weak pressure. The brake represented has its friction shoes, *m*, *m*, made of cast-iron. The break spindle, A, is suspended by a compensating lever, *n*, which allows an equal distribution of the force on each shoe. The rods, *s*, *s*, are screwed, and may be adjusted at pleasure.

The following remarks are extracted from the French Report before referred to:—

Although railways have increased five-fold the rate of locomotion, the means for stopping trains are neither more rapid nor more certain than they were on the old roads, while the maximum pressure for stopping the motion of the wheels is actually much less in proportion to the weight of the body to be stopped. The engine driver who regulates the moving power ought also to have at command all the means of stopping the train. At present he can only stop the wheels of the tender, and, in urgent cases, those of the locomotive.

At present trains are stopped by guards who manually apply the brakes; but why not employ for this purpose the *momentum*, or surplus velocity of the train, which, as before explained, is available the moment the engine driver slackens the speed of his locomotive? we may thus attain two important objects—unity and rapidity of action. The application, however, of this system is subject to three conditions:—1. It is indispensable that the

reduction of speed, effected a-head, by means under the control of the engine driver, should produce a sufficiently strong and prolonged action on the body of the train. 2. It is indispensable, on the other hand, that the brakes should not be brought into play simply through some accidental variation in the speed of the locomotive and the reaction of the carriages occasioned thereby. 3. It is indispensable that the train should be able to be moved backwards, or *shunted*, without the brakes being brought into play, and so impeding the backward movement.

Let us examine these three points *seriatim*.

I. *Intensity and Duration of Action.*—In M. Guérin's invention the buffer rods act on the brakes, through the buffer springs, while the pressure so applied to the buffers is quadrupled and transmitted to the brakes by a series of levers. The engine driver is enabled, by simply slackening the speed of the locomotive and tender, and without reversing the engine, to produce between the component parts of the train a pressure sufficiently intense to stop rapidly and lock at least one-fourth of the wheels of the whole train. It will be observed that it is thus in the power of the engine driver to reduce the speed of the train without producing between its component parts any strong reaction, and consequently without bringing the self-acting brakes into play. The ease with which the pressure of the brakes may be regulated at will and according to circumstances is one of the most satisfactory features of M. Guérin's invention. When, on an emergency, it is necessary to pull up very suddenly, the engine-driver ahead has only to stop short as abruptly as possible; but if he has time and space to spare, if, for instance, he is approaching a station at the

Fig. 3.

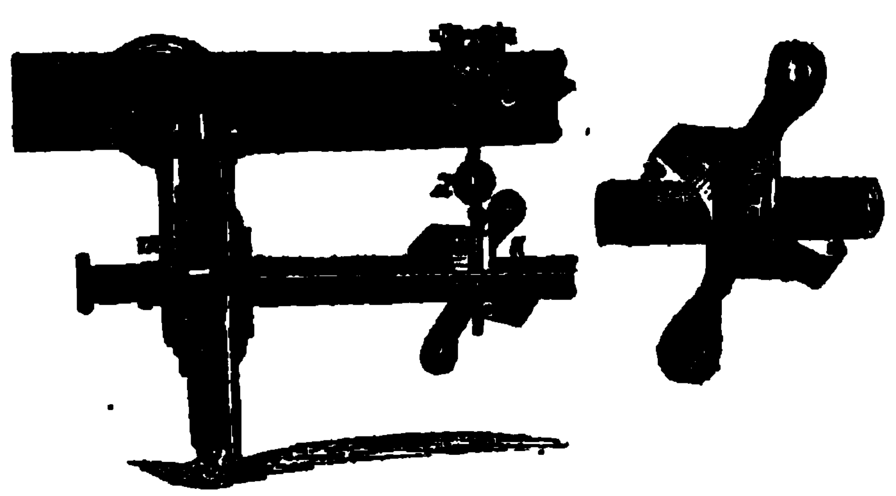
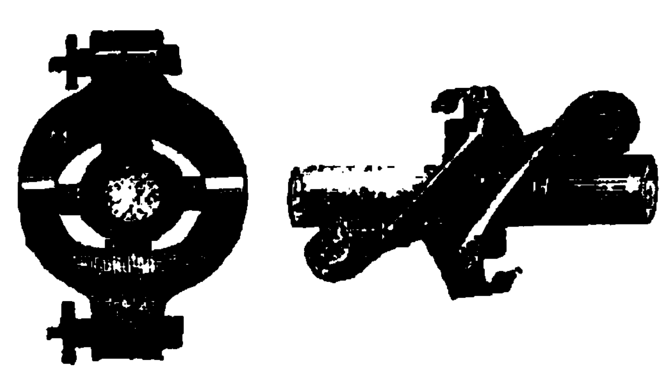


Fig. 4.



summit of an incline, he will act gently, gradually on the locomotive brake. In a word, he can regulate the pressure of the self-acting brakes with the same precision as if they were under his hand. Experience proves that an intelligent engine-driver soon learns to take advantage of the sensibility of the self-acting brake. Its delicacy is, indeed, one of its most characteristic features. Some objectors jumped to the conclusion that the self-acting brakes would be brought into contact with the wheels of the carriages only for a very short time, say during the first part of the elastic shock, but that the brakes would be withdrawn the moment afterwards. The reasoning, however, on which the above objection rests is incorrect, whether as regards goods trains or passenger trains.

II. *Mode of Preventing the Spontaneous Action of the Brakes.*—M. Guérin has had the forethought to give the buffer spring, T, the middle of which acts on the brake lever, a certain play (*temps perdu*). He has, moreover, connected it by a tie rod to a recalling spring, *r r*, whose rigidity, determined by trial, is such that it equilibrates of itself the maximum reactions developed by the simple irregularities of the relative speeds, whatever be the position of the vehicle in the train. The automatic action of the brake, independently of the engine-driver's wishes, is impossible, unless a stoppage take place ahead; in other words, unless a collision occur, and in such a circumstance its action would mitigate the gravity of the consequences. Another use of this recalling spring is to liberate the buffers and the brakes, and thereby restore the train to its normal length as soon as the stoppage has been effected.

III. *Facility for Backing and Shunting.*—It is plain that the train could not be backed if the brakes were constantly connected with the buffers. Now backing is indispensable in a variety of circumstances. It is this indispensable facility for backing which puzzled and nonplussed every one who tried to apply the brake through the buffers. M. Guérin has been more successful. Ever since 1843 that gentleman has, with laudable perseverance, striven to produce a self-acting brake; and as early as the above date he perceived that the following was a condition *sine quâ non* to his success, viz.: on the train being stopped and restored to its normal length by the simultaneous action of the buffer and the additional recalling springs, it is indispensable that, as an unfailing consequence of said movement

of expansion, the brakes should cease all connection with the buffers. But, on the other hand, it is indispensable that the connection between the buffers and the brakes should re-establish itself as soon as the train acquires a certain velocity, in order that the break may, in case of need, be brought into play. M. Guérin has solved this double problem, by a piece of mechanism both simple and ingenious, and which is clearly shown in the accompanying engravings. Let us suppose a train starting. So long as the speed is slow, say, for instance, four or five miles an hour, the self-acting brake is independent of the buffers, inasmuch as the draw-bar does not yield, the train is like an ordinary one. But it is clear that the self-acting brake will be brought into connection by an increased velocity, and continue in connection so long as that increased velocity is maintained. As soon as the increased velocity attains the limit indicated of four or five miles an hour, the draw-bar becomes independent of the end cross-stay of the frame, in order to restore to the buffer-spring the liberty of back movement, which puts, as we have seen, the brake in action. In other terms, the shoulder of the coupling-hook butts against the cross-stay, while the velocity is inferior to the fixed limit, and the bar is free to slide, on the contrary, in its eye, as soon as this limit is attained. This condition is fulfilled by means of a double fork, *b*, inserted in the first period between the shoulder of the hook and the cross-stay, and disengaged in the second period. The relation between the position of the fork and the velocity of the train is realized by means of a centrifugal "*manchon*." It is a kind of cast-iron collar, H, encircling one of the axles, to which it is attached by two gudgeons, forming an axis round which it turns freely. At a state of rest this collar is brought back by two small springs, and lies against the axle. On the velocity increasing, the collar rises by centrifugal force, and places itself in a plane normal to the axle, as soon as the velocity attains the degree fixed for the disengagement of the stop-hook. This latter is connected by a long rod, *e*, to an oscillating lever, *c*, suspended from the frame of the waggon, and which is kept by a weight, *d*, constantly acting on the collar of the axle. M. Guérin has given respectively to the collar and the springs such a form and stiffness that the lever, on changing its inclination, must disengage the fork as soon as the velocity attains the limit fixed. The elements are then in their normal state, and remain so as long as the velocity is not entirely destroyed. It is only when the train is stopped and then extended, that the fork lodges anew in the space, become free, between the cross-stay and the coupling-hook, and thus the initial state re-establishes itself of its own accord.

Theoretically the invention was complete, but it had yet to be tested practically.

The Orleans Railway Company, alive the importance of the invention, gave M. Guérin permission and every facility to try his brake on the Corbeil line. The results of the trials on the Corbeil line were in every respect most conclusive, and have been confirmed by subsequent experiments. The mechanism is not subject either to rupture or to derangement, nor is it at all expensive for repairs.

The satisfactory results of the first trials could not fail to command the attention of the authorities. At their request the Orleans Company willingly allowed the inventor to transfer the trials to their main line (which is better adapted for testing the efficacy of brakes), and to adjust his self-acting brake to several carriages in the same train. In consequence of the results of this fresh series of trials having appeared fully to justify the favourable opinion which some engineers had already publicly expressed upon M. Guérin's invention, we were commissioned by the Minister of Public Works to investigate the trials on the Orleans line, and to ascertain, by trials under our own observation, the advantages, if any, of this new system of brakes.

The Report concludes thus:

Considering, therefore:—1. That M. Guérin's self-acting brake places, as is highly desirable, the means of stoppage under the immediate control of the engine driver: 2. That its mechanism is simple, that it nowise impedes the connecting or disconnecting of the carriages, the backing and shunting of the train, that the self-acting brakes act independently of each other, and not by a combined action, which might lead to all the brakes failing at once; 3. That it is peculiarly suitable for the application of an impeding force, the intensity of which can be regulated at pleasure; 4. That it is incontestably superior to all other brakes yet invented, surpassing them all by its simplicity, its certainty and promptitude of action, and, in short, its combined practical merits: The undersigned commissioners have therefore the honour to submit the subjoined suggestions to your Excellency:—1. The Government should call the attention of Railway Directors to the decided advantages of M. Guérin's self-acting brake as regards safety and economy, and to the propriety of their adopting it. 2. That the present report and drawings be published in the "Annales des Ponts et Chaussées," and in the "Annales des Mines."

SINGULAR ELECTRICAL PHENOMENA IN THE UNITED STATES.

Professor Loomis, of America, read a paper at the Dublin meeting of the British Association, detailing an account of a class of very singular natural phenomena occurring in that country. The following detailed report is slightly abridged from the *Athenæum* ;—

Atmospheric electricity is very abundant in the United States, and often exhibits phenomena more remarkable than are witnessed in most of the countries of Europe, especially in England and Germany. These phenomena are not confined to any particular season of the year; but the exhibitions in summer appear under a different form from those of winter. In summer, free electricity exhibits itself chiefly in the form of lightning during thunder-storms; and these exhibitions are often among the most sublime and impressive phenomena witnessed in any part of the globe. The telegraph wires are exceedingly sensitive to the approach of a thunder-storm. The wires are often charged with electricity from the effects of a storm so distant that no thunder is heard or lightning seen. I have often stood at such times in a telegraph office, and introduced my own body into the electric circuit, by taking hold of a telegraph wire with one hand, and with the other hand grasping a wire which communicated with the earth. A frequent twinge is felt in the arms, and sometimes through the breast. The shock is pungent and painful, even when scarcely the slightest spark can be obtained by bringing the two wires nearly in contact. Such experiments are unsafe when the electric cloud is near. If, during the passage of a thunder-shower, the telegraph apparatus is left in communication with the long telegraph wires, the fine wires of the electro-magnets are almost sure to be melted, and the magnets thereby rendered useless. Sometimes, in telegraphic offices, there occurs an explosion which melts large wires, and is dangerous to human life. The effect of a feeble current of atmospheric electricity on the telegraph wires is the same as of a current from a galvanic battery. It makes a dot on the telegraph register; and, when a thunder-storm passes in the neighbourhood of a telegraph line, those dots are of constant occurrence; and, being interposed between the dots of the telegraph operators, they render the writing confused and often illegible. The operators are, therefore, commonly compelled to abandon their work when a thunder-shower prevails in the vicinity of any part of the line. The *aurora borealis* is very common in the United States, even in summer; but, on account of the long-continued twilight, it is seldom witnessed with such brilliancy in summer as in winter. During winter, thunder-storms in the United States are of very rare occurrence; but even at this season they are not entirely unknown. Sometimes in mid-winter, after a series of unusually warm days, a strong wind suddenly springs up from the west, attended by a shower, during which several flashes of lightning, accompanied by thunder, are noticed. Such a shower is invariably followed by a great and sudden fall of the thermometer. But, while electrical discharges in the form of lightning are rarely witnessed in winter, other electrical phenomena of great interest are of almost daily occurrence. These phenomena consist of free electricity residing upon almost all bodies resting on the earth, but sufficiently insulated. This free electricity is particularly noticeable on the clothes and hair of the human body. During the cold months of winter, the human hair is commonly electrical, and especially when it is brushed with a fine comb. Often at such times the fine hairs are seen to stand erect; and the more you comb to make them smooth, the more obstinately they refuse to keep their proper place. If you present your fingers to those electrified hairs, they fly to meet you, like a lock of dry hair attached to the prime conductor of an electric machine. In such cases there is but one remedy; the hair must be thoroughly moistened, after which it lies quietly in its place. During the same season of the year, all woollen articles of clothing become highly charged with free electricity. The pantaloons, in particular, are found to attract light, floating particles of dust, down, &c., especially near the feet; and it is impossible to cleanse them by brushing. The longer you brush, the more your clothes are covered with dust and lint. Nothing less than a wet sponge is efficient to cleanse them. At night, when you take off your pantaloons, you hear a distinct crackling noise, and, in a dark room, perceive a succession of flashes. You draw your fingers down over them, especially near the lower extremities, and you perceive a repetition of the crackling noise, accompanied by distinct flashes of light. As you take off your flannel drawers, the crackling is again heard, louder than before, and the flashes of light are more vivid. If you take a woollen blanket from your bed, hold it suspended in your left hand, and draw the fingers of your right hand over it, the crackling is equally loud and longer continued. Your fingers seem enveloped in a blaze of light, and the flashes can be several times renewed. Brute animals do not escape the general electrical influence. In a cold, frosty night, you draw your hand gently over a cat's back, and you hear a distinct crackling noise, while the cat shows unmistakeable signs of bad

temper, and refuses her consent to play the philosopher with you. Persons riding on horseback during a snow-storm in the night have frequently noticed the extremities of their horse's ears tipped with light, like that of a pale, steady flame. The preceding phenomena are either unknown in summer, or are only noticed occasionally, and in an inferior degree; but the *aurora borealis* is often witnessed in the United States during winter, and frequently attains a splendour such as is surpassed in but few portions of the globe. During the severity of winter, and especially in houses which are furnished with heavy carpets and kept thoroughly warmed, even more remarkable electrical phenomena are often witnessed. If you walk across such a carpet with a slight shuffling motion, and then present your knuckle to some metallic object, as the knob of a door, you perceive a decided spark and a faint snap. By walking rapidly two or three times back and forth, the spark may be increased, and becomes, perhaps, a quarter of an inch or more in length, and has great intensity, accompanied by a smart snap. This phenomenon is not peculiar to any particular house or style of carpet, but, in the cold months, can be witnessed in almost every house in New York where there is a thick woollen carpet, and the room is kept habitually well heated and dry. In some houses these phenomena are so remarkable that persons who have never witnessed them, have listened to the accounts with evident incredulity; but most of these phenomena have become so familiar in New York, that they have ceased to excite surprise. The electricity thus developed exhibits the usual phenomena of attraction and repulsion, and is capable of igniting combustible bodies. By skipping a few times across the room with a shuffling motion, and then presenting the knuckle to an open gas-burner, the gas may be ignited. This experiment generally fails unless the burner be warm; but if, after a jet has been some time burning, you extinguish the flame, and then draw a spark with your knuckle from the warm burner, the gas is readily ignited. After a careful examination of several cases of this kind, I have come to the conclusion that the electricity is excited by the friction of the shoes of the inmates upon the carpets of the house. I have found by direct experiment, that electricity is developed by the friction of leather upon woollen cloth. For this purpose I stood upon an insulating stool, and spreading a small piece of carpeting upon a table before me, rubbed a piece of leather vigorously upon it; and then bringing the leather near the cap of a gold leaf electrometer, found that the leaves were repelled with great violence. The electricity of the leather was of the resinous kind. Electricity must, therefore, necessarily be excited whenever a person walks with a shuffling motion across a carpet; but it may be thought remarkable that the electricity should be intense enough to give a bright spark. In order to produce the highest effect there must be a combination of several favourable circumstances. The carpet, or at least its upper surface, must be entirely of wool and of a close texture. From my own observations I infer that heavy velvet carpets answer this purpose best. Two thicknesses of ingrain carpeting answer very well. A drugget spread upon an ingrain carpet yields a good supply of electricity. The effect of the increased thickness is obviously to improve the insulation of the carpet. The carpet must be quite dry, and also the floor of the room, so that the fluid may not be conveyed away as soon as it is excited. These conditions will not generally exist except in winter, and in rooms which are habitually kept quite warm. The most remarkable cases which I have heard of in New York have been in close, well-built houses, kept very warm by furnaces. These furnaces are erected in the cellar and are filled with anthracite coal, which is kept constantly burning from autumn till spring. The heated air is conveyed to the hall, the parlours, and to every room in the house, as far as is desired, through large flues built in the walls, the flues having a section of about one square foot. In such a house the wood during winter becomes very dry, and all the furniture shrinks and cracks. The electricity is most abundant in very cold weather. In warm weather only feeble signs of electricity are obtained. The rubber, viz., the shoe, must also be dry like the carpet, and it must be rubbed upon the carpet somewhat vigorously. By skipping once or twice across a room with a shuffling motion of the feet a person becomes highly charged; and then upon bringing the knuckle near to any metallic body, particularly if it have good communication with the earth, a bright spark passes. In almost any room which is furnished with a thick woollen carpet, and is kept tolerably warm and dry, a spark may thus be obtained in winter; but in some rooms the insulation is so good, and the carpets are so electrical, that it is impossible to walk across the floor without exciting sufficient electricity to give a spark. It may be thought that in walking across a room there is but little friction between the shoe and carpet, but it should be remembered that the rubber is applied to the carpet with uncommon force, being aided by the entire weight of the body, so that a slight shuffling motion of the feet acts with great energy.

MILLER'S METHOD OF PROPELLING VESSELS.

Mr. W. V. Miller, Paymaster, R.N., has submitted to us the following account of a method of propelling ships which he has recently patented, and which he considers calculated to effect a complete revolution in marine propulsion. It will be seen that the propellers employed are reciprocating pistons fitted at the midship part of the ship.

"The sketch," says Mr. Miller, "represents the midship part of a sixty-gun frigate, from M in the fore body to 14 in the after body, showing the required alteration in the ordinary construction, in that part where the propellers are placed, as seen in figs. 1, 2, 3, 4, 5. The small half-section, fig. 2, shows the manner of building three frames at A, to form the two cavities amidships, on each side of the keel, with a vertical section of the raised kelson or deadwood, fig. 5. In these cavities are placed tight metal tubes or barrels, whose elliptical orifices are seen in the inverted plan, fig. 4, with upper and lower flanges to each, and keyed with metal sleepers of the same length, filling the space between the tubes, having long bolts passing from the outer plates, through which the tubes open, and fasten with screw nuts to strong inner plates, securing the whole solidly within the cavities, and adding considerable strength to the usual construction of ships in that part.

"The propellers are pistons, B, fig. 1, working water-tight, or nearly so, in the tubes; such water as may pass round their peripheries, forced by the pressure of the columns of immersion during the effort of the engine in propelling, is forced by the return of the propellers through valves, into two cisterns, C, fig. 3, and is taken from thence by the working of the engine to supply the condensers and boilers; and as the quantity thus admitted will be far too little for that purpose, the propellers return *in vacuo* with the weight of the pressure of the column of immersion, together with that of the atmosphere."

The following is Mr. Miller's statement of the "advantages" which his method possesses:—

"The propelling pistons in the bottom,

FIG. 4.

FIG. 3.

amidships, acting by direct impulse from steam power in unremitted alterations against an unbroken fulcrum of water, not influenced by the rolling and pitching motion.

"The machinery closely connected in a central position, and occupying little space; the propellers pressing horizontally at the depth of the midship draught, no water is displaced by their action, the power of which, subject to no variation, will be even and regular, without imparting vibration.

"The receding propellers, pressed by the weight of water on their areas, while those propelling present their surfaces to the columns of pressure with the entire power of the engine: the latter, as the transverse shaft connects the four steam cylinders, is very materially assisted by the power of the said pressure of water on the receding propellers, which, but for them, would flow into the vacuous spaces in the tubes with great velocity.

"As the resistance increases from head winds, &c., the work to be overcome by the power of the engine also increasing, its strokes are reduced in the same ratio, so that steam being thereby economised, the consumption of fuel is only in proportion to the progress made good compared with the speed attainable from the said power under the most favourable circumstances; and the power being incessant, momentum ensues without a multiple being required.

"The ship may be constructed to draw very little water, and, in adapting this mode of propelling, is considerably strengthened.

"The rectilinear action of the propellers, together with the proximity of all parts of the machinery to the ship's floors, combine strength and security, while boilers, engines, and propellers are not liable to injury from shot, collision, or entanglement.

"Steam and sail used simultaneously; the former may be dispensed with in an instant, without the propellers in any way impeding sailing qualities, so that full advantage may be taken of every favourable breeze, without loss of time or risk of accident; and if the wind be light, steam may again be used with equal facility, and at any lower number than the maximum of revolutions of the engine, by which means every advantage may be taken of opportunities for the economy of fuel."

Mr. Miller considers that the want of power to back the ship astern, which attends his system, is no detriment to a vessel, danger being better avoided by putting a ship about than by backing her astern.

THE CONSERVATION OF FORCE.

The following are the remarks of Dr. Lloyd on this subject in his Presidential Address to the British Association, as reported in the *Athenæum:*

The future of physical science seems to lie in the path upon which three of our ablest British physicists have so boldly entered, and in which they have already made such large advances. I may, therefore, be permitted briefly to touch upon the successive steps in this lofty generalization, and to indicate the goal to which they tend. It has been long known that many of the forces of nature are related. Thus, heat is produced by mechanical action, when that is applied in bringing the atoms of bodies nearer by compression, or when it is expended in friction. Heat is developed by electricity, when the free passage of the latter is impeded. It is produced whenever light is absorbed; and it is generated by chemical action. A like interchangeability probably exists among all the other forces of nature, although in many the relations have not been so long perceived. Thus, the development of electricity from chemical action dates from the observations of Galvani; and the production of magnetism by electricity from the discovery of Oersted. The next great step was to perceive that the relation of the physical forces was mutual; and that of any two, compared together, either may stand to the other in the relation of cause. With respect to heat and mechanical force, this has been long known. When a body is compressed by mechanical force, it gives out heat; and, on the other hand, when it is heated, it dilates, and evolves power. The knowledge of the action of electricity in dissolving the bonds of chemical union followed closely upon that of the inverse phenomenon; and the discovery of electro-magnetism by Oersted was soon followed by that of magneto-electricity by Faraday. With reason, therefore, it occurred to many minds that the relations of any two of the forces of nature were mutual—that that which is the cause, in one mode of interaction, may become the effect, when the order of the phenomena is changed;—and that, therefore, in the words of Mr. Grove, one of the able expounders of these views, while they are "correlative," or reciprocally dependent, "neither, taken abstractedly, can be said to be the essential cause of the others." But a further step remained to be taken. If these forces were not only related, but mutually related, was it not probable that the relation was also a definite one? Thus, when heat is developed by mechanical action, ought we not to expect a certain definite proportion to subsist between the interacting forces, so that if one were doubled or trebled in amount the other should undergo a proportionate change? This anticipation, it has been already stated, has been realized by Mayer and Joule. The discovery of the mechanical equivalent of heat has been rapidly followed by that of other forces; and we now know not only that electricity, magnetism, and chemical action, in given quantities, will produce each a definite amount of mechanical work, but we know further—chiefly through the labours of Mr. Joule—what that relation is, or, in other words, the mechanical equivalent of each force. The first step in this important career of discovery—though long unperceived in its relation to the rest—was, undoubtedly, Faraday's great discovery of the definite chemical effect of the voltaic current. The last will probably be to reduce all these phenomena to modes of motion, and to apply to them the known principles of dynamics, in such a way as not only to express the laws of each kind of movement, as it is in itself, but also the connection and dependence of the different classes of the phenomena. A bold attempt at such a generalization has been made by M. Helmholtz. The science of Thermo-dynamics starts from the principle, that perpetual motion is impossible, or, in other words, that we cannot, by any combination of natural bodies, produce force out of nothing. In mechanical force, this principle is reducible to the known law of the conservation of *vis viva;* and M. Helmholtz has accordingly endeavoured to show that this law is maintained in the interaction of all the natural forces; while, at the same time, the assumption of its truth leads to some new consequences in physics, not yet experimentally confirmed. Expressed in its most general form, this principle asserts that the gain of *vis viva* during the motion of a system is equal to the force consumed in producing it; from which it follows, that the sum of the *vires vivæ*, and of the existing forces, is constant. This principle M. Helmholtz denominates the conservation of force. A very important consequence of its establishment must be, that all the actions of nature are due to attractive and repulsive forces, whose intensity is a function of the distance—the conservation of *vis viva* holding only for such forces. It is usually stated, in mechanical works, that there is a loss of *vis viva* in the collision of inelastic bodies and in friction. This is true with respect to the motion of masses, which forms the subject of mechanical science as at present limited; but it is not true in a larger sense. In these, and such-like cases, the movement of mas-

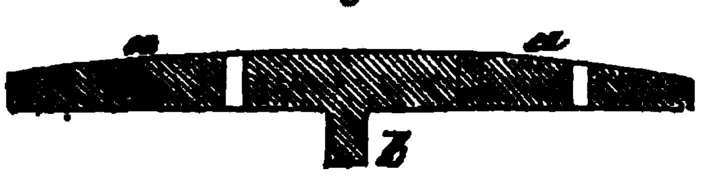
ses is transformed into molecular motion, and thus reappears as heat, electricity, and chemical action; and the amount of the transformed action definitely corresponds to the mechanical force which was apparently lost. In the cases just considered, mechanical action is converted into molecular; but molecular actions of different kinds are themselves in like manner interchangeable. Thus, when light is absorbed, *vis viva* is apparently lost; but, not to speak of phosphorescence, in which the light absorbed, or a portion of it, is again given out, in all such cases heat and chemical action are developed, and in amount corresponding to the loss. Hence the apparent exceptions to the principle are in reality confirmations of it; and we learn that the quantity of force in nature is as unchangeable as the quantity of matter. This, however, is not true of the quantity of available force. It follows from Carnot's law that heat can be converted into mechanical work only when it passes from a warmer to a colder body. But the radiation and conduction by which this is effected tend to bring about an equilibrium of temperature, and therefore to annihilate mechanical force; and the same destruction of energy is going forward in the other processes of nature. Thus, it follows from the law of Carnot, as Prof. Thompson has shown, that the universe tends to a state of eternal rest; and that its store of available force must be at length exhausted. Mr. Rankine has attempted, in another method, to combine the physical sciences into one system, by distinguishing the properties which the various classes of physical phenomena possess in common, and by taking for axioms propositions which comprehend their laws. The principles thus obtained are applicable to all physical change; and they possess all the certainty of the facts from which they are derived by induction. The subject matter of the science so constituted is energy, or the capacity to effect changes; and its fundamental principles are, first, that all kinds of energy and work are homogeneous; or, in other words, that any kind of energy may be made the means of performing any kind of work; and, secondly, that the total energy of a substance cannot be altered by the mutual action of its parts. From these principles the author has deduced some very general laws of the transformation of energy, which include the known relations of physical forces.

PEDDER'S PATENT METHOD OF STRENGTHENING METALLIC STRUCTURES.

Mr. W. Pedder, master mariner, a gentleman who has had considerable experience in connection with the working of iron ships, has patented a very excellent improvement in the construction of metallic structures. His invention consists in strengthening plates, planks, beams, &c., employed to form metallic and other structures, at the parts of such structures where the ends are brought together, by means of strengthening joint plates, having a rib or feather projecting therefrom, against one side of which feather or rib one end of one plate is made to abut, and against the opposite side of which one end of the next plate employed in the structure is also made to abut. The projecting rib or feather is of a greater depth than the thickness of the plates. After the ends of the plates have been made to abut against the rib, they are rivetted to the strengthening joint plate on each side of the projecting piece, and the projecting edge of the rib is beaten in to form a solid mass between the plates, and may be burred down so as to form a sort of rivet over the ends of the plates.

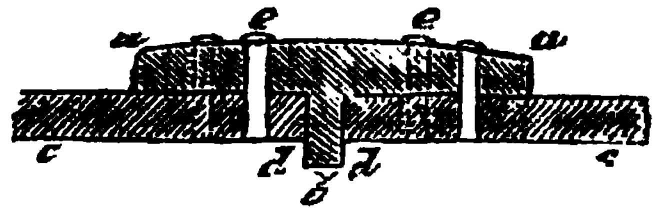
The annexed engravings show the strengthening joint plates. Fig. 1 is a

Fig. 1.



sectional view of a strengthening joint plate in its most simple form; *a* is the body of the plate, and *b* the rib or feather. Fig. 2

Fig. 2.

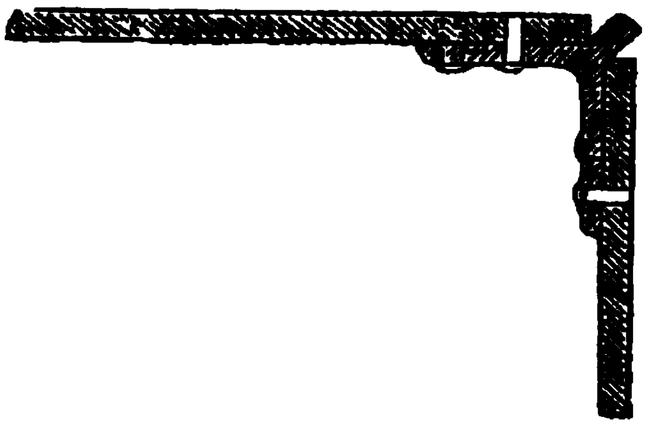


shows in section two plates strengthened by the strengthening joint plates. *a* is the body of the joint plate, *b* the rib, *c c* two plates, the ends of which, *d d*, are brought against the rib, *b*, and the whole secured by rivets, *e e*, and by beating over the projecting end of the rib, *b*, so as to turn down and form a rivet over the ends of the plates. Fig. 3 is a section of the strengthening joint plate, formed like angle iron, and applied to strengthen structures, such as boilers, tanks, &c., where plates are brought together at angles.

In work where the surface is required to be flush, all the projecting portion of the rib not required to completely fill up the

space between two plates to be united may be dressed off; but for such work as stringer

Fig. 3.



plates, keelsons, beam-ties, and the like, no dressing will be necessary or desirable.

There can, we think, be no doubt that metallic structures formed with Mr. Pedder's improvement will be very much stronger and more durable than any existing structures. The ribs of the joint plates will, of course, require to be made of good iron, but there will be no difficulty in providing them.

SILVER'S GOVERNOR FOR REGULATING THE SPEED OF MARINE STEAM ENGINES.*

BY THOMAS SILVER, PHILADELPHIA, U. S.

The screw (and it will soon be the only plan of steam propulsion over the ocean) increases the demand for some practical improvement in the marine engine that will facilitate the proper application of the steam under all circumstances, and I therefore wish to explain a plan of governor, the action of which is as analogous to the old centrifugal governor as the spring balance of a watch is to the pendulun of a clock—the watch being rendered by that improvement quite as valuable for preserving the uniformity of time, whether in our pocket, on a fast trotting horse, or under the pillow; whilst the clock must be confined to a fixed position, and this is attained on similar principles, differing, in fact, only in mechanical arrangement to make it applicable to governing the flow of steam—that is to say, in the governor, which I have now the honour to submit to the section G of the British Association, the arms of an ordinary centrifugal governor, each extended to an equal distance beyond their axis of motion, and loaded at their four extremities with balls of equal weight, perfectly balancing each other. Thus the influence of the force of gravity is entirely evaded, and a spiral or reacting spring is substituted to resist the centrifugal force in the action of the instrument, each loaded arm oscillating in an opposite direction to the other, which serves to keep each of them at equal angles with the spindle that bears them. Hence the instrument will not only work with equal facility in any position, whether fixed, horizontal, perpendicular, or angularly, but it also can be thrown about at pleasure, without affecting the truthfulness or sensitiveness of its operation; and as its centrifugal force is resisted mechanically, instead of the force of gravity, as in the ordinary governor, we can increase its powers of action to any extent, so also we can increase the force of the spring, and thus more nicely and readily effect the same object. This fact, connected with the driving point being in the centre of the rigid arms that bear the weight, renders the instrument extremely sensitive and quick in an action; and it may not be out of place here to mention that it is now applied for regulating stationary engines employed for driving metal rolling mills, printing presses, and in many other situations where the machinery had been entirely uncontrollable by the best forms of governors previously tried. Captain James West, of the steam-ship *Atlantic*, who has had the greatest experience with it, says, as a safeguard to the machinery of a steamship it is invaluable, and the object of the originator is effectually accomplished by it.

* British Association, 1857.

HARRIS'S PATENT AIR-LOCKS, VALVES, &c.

Mr. James Harris, engineer, of Hanwell, has obtained a patent for certain methods of employing compressed air in working locks, taps, valves, &c. The apparatus employed consists of two cylinders with air-tight pistons and valves; or of corrugated elastic air-tight cylinders secured at the ends to wood, and made to expand or close after the manner of a concertina or bellows; or of elastic air-tight spheres or spherical-ended cylinders worked by semi-spherical pistons. The connections from one part of the apparatus to the other are made by means of metal or other pipes. He also employs proof or test signals which indicate to the operator that the object is effected. These proof or test signals are produced by means of diaphragms, pressure gauges, elastic cylinders, and equilibrium cocks, valves, or whistles, either separately or combined, these arrangements being well understood. The invention also consists in an improved lock adapted to be worked by his apparatus, and in carrying out this part of his invention a cylinder is placed in the lock, and furnished with an air-tight piston

attached to the bolt. At the back of the piston is a powerful spring for forcing the bolt forward, and thereby effecting the locking; and when the bolt is forced forward by the spring, a tumbler working in a cylinder with a piston, with or without a diaphragm at bottom, falls into a notch in the bolt, keeping it in position as in an ordinary lock. A second tumbler is also provided with a catch to hold the bolt back against the spring when unlocked. The other part of the apparatus connected with the lock consists of a small air pump, placed, say, in a bed-room above, or in any other convenient place, the distance being of no consequence. The air pump has applied to it a gauge and whistle, and an elastic air-tight bag or elastic corrugated cylinder connected with an alarm. The connections between the pump and the lock are made of metal or other strong pipes. In unlocking, the handle of the air pump is worked one, two, or three strokes, according to the length of the pipes, and the pressure required to act upon the piston and spring. The slightest pressure under the piston or diaphragm of the first tumbler lifts it out of the notch to allow of the bolt sliding backwards, which, when the pressure is increased, it will do, until caught by the second tumbler, the proper distance being indicated by the pressure gauge. To shoot the bolt of the lock it is necessary to produce increased pressure in the air pump to force the bolt further back, thereby lifting the keeper or second tumbler on to a catch where it is out of the way, but from which it is instantly liberated on the bolt sliding forward, so as again to be ready for the unlocking process. The compressed air, when let into the corrugated elastic cylinder by a tap to allow of the piston and bolt sliding forward, will show, by the space it occupies on an index, that the bolt is shot. The bolt may be shot by pressing in a pin in the side, top, or bottom of the safe or strong room with the finger, and other bolts of ordinary locks may be carried forward at the same time to be unlocked by a key or keys only. There is at the air pump end of the lock an alarm acted on either by the elastic cylinder or the piston of the pump. The same apparatus may be used much simplified, that is, with a cylinder and spring only for latches of gates and doors.

TURNBULL'S HEAVING-UP CRADLES FOR SHIPS.

Mr. R. Turnbull, of Harwich, has introduced an improvement in the cradles placed on inclined ways or rails for heaving-up ships out of the water, which has for its object to provide for the heaving up of a ship drawing more water than any which can be raised by the ordinary cradle on the same ways. He constructs a cradle in parts, so that one part may separate a certain distance from the other, while at the same time the parts of the cradle are suitably held together to limit the separation, and to keep them in their proper relative position while either elongated or contracted; when contracted, the cradle is considerably less in length than the ship which may be lifted on it. In placing a ship on the cradle, the parts of the cradle are brought close together and lowered down the ways, and the ship brought over it so as to ground or take the front part of the cradle with her fore foot a little in front of the fore part of the cradle, her stern at the time projecting a considerable distance beyond the after end of the cradle. The cradle being now hove upon the fore part, advances up the ways, and lifts the fore part of the ship, the after part at the time being afloat, and not on the after part of the cradle. During this time, the other parts of the cradle remain stationary, until the fore part has advanced, say about fifteen or sixteen feet, the limit of its sliding connecting bars. Having arrived at this limit, the second part of the cradle follows the first up the ways, and separates from the after part until it has moved the distance of say ten or twelve feet, as limited by the connecting bars; the whole cradle now (if in three parts) moves together. By this time the stern of the ship will be brought immediately over the after part of the cradle on which she settles or grounds, and is supported as usual. By forming the cradle in three or more principal parts, support is given to the vessel at suitable points, without much intermediate space between the parts when separated, while at the same time affording considerable extent of elongation. If the cradle is divided in two parts it will, in some respects, answer the purpose, but with less advantage than if further subdivided. If there is plenty of water for the ship to come over the cradle, it may be adjusted and fixed at once to the length of vessel to be raised.

LIEUTENANT KINGSLEY'S HYDRAULIC APPARATUS.

At page 141 of the *Mechanics' Magazine* for August 8, in our list of "Provisional Protections," our readers will have observed one granted to Lieut. Jeffries Kingsley, with this very singular title:—"Obtaining or applying a primary motive power, namely, the water of a river, which causes a vacuum in an exhausting receiver, which may be transferred by tubes to other machines, causing water and ores to be raised from mines, likewise causing the steam engine to be superseded, water being cheaper than coals." The inventor of this novelty has since called on us, and requested us to publish an article upon the subject. The provisional specification of the invention appears to have consisted of the following words:—"Briefly, the laying down of a tube or rarified air cylinder from a mine or from an atmospheric railway." By an examination of the papers placed before us, we find that the invention consists in placing a cylinder or some similar vessel in such a position that water conducted from a river or other source may fill it as frequently as is desirable, and in connecting with this cylinder or vessel a pipe leading to some subterranean channel or abyss into which the said water will run off. The motive power is obtained by alternately filling and emptying the cylinder, thus working a piston, either directly, or by leaving a vacuum when the supply is shut off and the tail pipe opened. The invention is, of course, to be used mainly where the water cannot be applied immediately to a wheel or turbine. Lieut. Kingsley wishes us to state that in carrying out his invention "the mining proprietary have to deal with a gentleman and a British officer," he being a half-pay lieutenant of the 3rd Dragoons.

POWERS' PATENT SCUTTLE FOR SHIPS.

Mr. G. Powers, of Wallclose-square, London, has patented the improved lighting and ventilating scuttle for ships, represented in the annexed engraving. The back of the scuttle is shown, with part broken away, so as to show the interior or sides. A is the plate for fixing to the deck. This plate is cast with a rim and four arms, two of the spaces between which are glazed, and two open. C is a rim or ring with four arms cast in it, two of the spaces, B, B, between the arms are glazed, that they may correspond to the glazed parts in the aforesaid rim. The rim and arms, C, are fitted and ground on to the first, so that they will form a water-tight joint; the rims are kept together by the pin or screw, a, on which the ring and arms, C, are capable of being partially rotated. These rims are held in close contact by a cover, D, part of which is broken away to show the circular quadrant rack, E, formed on the edge of the ring, C. The cover, D, is secured to the plate, A, by screws, *b*, passing through the lugs, *c*, of the cover, D. F is a pinion enclosed in the cover, D: this pinion gears into the rack, E, and is used to partially rotate it. When it is moved through the whole length of the rack, a quarter of a turn is produced to the rim, C, and thus completely closing or opening the scuttle by bringing the glass in each ring opposite the empty space in the other, or *vice versâ*. One of the journals on which the pinion, F, rotates, is made of large diameter, so that a square hole may be formed in it of sufficient size for the introduction of the square end of a key to turn it by when necessary. The advantages of such a scuttle need no description.

THE SUBMERGING OF ELECTRIC TELEGRAPH CABLES.

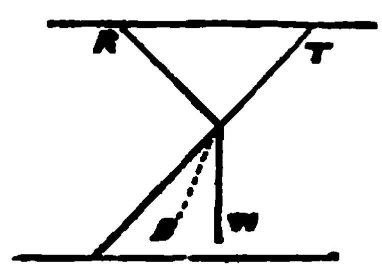
To the Editors of the Mechanics' Magazine.

Gentlemen,—I have just received the last number of your Magazine, and perceive that you have been kind enough to publish a very long abstract from a paper I had the honour of reading to the British Association on the submerging of telegraph cables. Not expecting any such notice to be taken of it, I had merely sent the friend, from whom, doubtless, you received it, my first rough copy, which is full of inaccuracies,* the

* What a pity it is that gentlemen allow these "first rough copies" which are "full of inaccuracies," to get into the hands of Editors!—for we dare not re-write, or seriously alter the paper of an author.—Eds. M. M.

more important of which I shall feel obliged if you will allow me to point out. In page 248, in the calculation of the area of cable resisted by the water, this should be 2000 fathoms $\times$ ½ inch $\times$ cosec 60°=580 square feet, not sin. 60°, and 475 square feet. The whole succeeding calculation is, of course, wrong.

After the calculation at the end of page 247, and beginning of page 248, of the velocity of a cable sinking vertically with its length inclined to the horizon at an angle of 45°, I should like to have added that a tension or friction equal in amount to the weight of a piece of cable long enough to reach vertically from the ship to the bottom of the sea is necessary to cause the motion to be vertical. The three forces acting on the cable are then



the weight W downwards, the resistance of the water, R, perpendicular to the length of the cable, and T the tension of the cable in the direction of its length. Evidently in this case (angle 45°) R=T,

$$\text{and } \frac{(R+T)}{\sqrt{2}} = \frac{2\,T}{\sqrt{2}} = W$$

$$\therefore T = \frac{W}{\sqrt{2}},$$

which is the weight of a vertical piece of cable from the ship to the bottom. The velocity must be about 2¼ miles an hour, the ship paying out 3⅝ miles of cable during that time with a cable of a specific gravity of 5, and ½ an inch thick, the tension required would be about 19 cwt. for one mile of depth, or 43 cwt.! for a depth of 2,000 fathoms. With a less tension the cable would evidently sink somewhat in the direction A B. If the ship move more rapidly, and the angle of the cable be consequently diminished, a less tension will suffice. However, I am convinced a cable of much less specific gravity, or else much smaller (if that can be), is advisable. There can be no such undercurrents as are lately reported. A cable formed of wire wound spirally would naturally sink laterally, the spiral forming a screw; and when we consider that hundreds of thousands of inches of wire are thus unequally acted on, we can readily believe the effect to be great.

I am, Gentlemen, yours, &c.,

T. W. Blakely.

Gosean Lodge, County Down, Sept. 14, 1857.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Do I misunderstand the purport of Captain Blakely's paper, at the late meeting of the British Association, and which you have recently inserted in your Magazine, containing a mathematical investigation of the conditions under which a submarine telegraph is laid; or is the author of it under some mental hallucination? Has he so concentrated his attention on his mathematical symbols, which is sometimes the case with mathematicians, as to be insensible to the physical circumstances of the operation he investigates?

He gives us the case of a cable, the specific gravity of which causes it to sink at the rate of 3½ miles an hour when inclined at an angle of 45°, and he supposes the vessel to move at the same rate; but he assures us "that the paying out of the cable would have to be at the rate of 3½ $\sqrt{2}$ = nearly 5 miles an hour, *to keep* the cable at this angle," that being the proportion in regard "to the length of a straight line, or the shortest possible distance between the point where a piece of cable would just be reaching the bottom of the ship; for whatever be the curve, it must be longer than the straight line." Now, does the author mean to say, that the expenditure of the cable is at this rate, even when the cable is not sinking to greater depths, but merely to its own level, and that it continues to be so during the whole distance traversed? It would really appear that this is his meaning, for besides the words in the above quotation which I have marked in italics, he in another place speaks of this difference under the conditions stated between the speed of the vessel and the velocity of the cable as "*a waste*," which it is not, so far as it is rendered necessary by the increasing depth of the ocean, and is so only on the supposition which the author must entertain, that this difference continues when the bottom is on a level. That there is a continual excess of expenditure of cable under all circumstances, is certainly his meaning, for he says, "What I have attempted to prove is this;—that a ship moving at the rate of 3½ miles an hour, and paying out a cable half an inch thick, and a specific gravity of 5, *must* pay out *not less* than 5 miles an hour," although it is also a condition of this case, that the cable does not *sink* more rapidly than at the rate of 3½ miles an hour. If he is not to be so understood, there is no point or object in his investigation.

It is so obvious as not to require even any reasoning on the subject, much less a mathematical handling of it (and which it seems has led its investigator astray), that a vessel depositing a cable whilst over a level

platform of the ocean, will lose none of it for any other reason than because the cable sinks faster than the vessel moves. Captain Blakeley, however, imagines that when these movements are equal, there must be a perpetual additional paying out expenditure in virtue of the inclination of the cable, and when at 45° in the ratio therefore of $\sqrt{2}$.

Of course, the rate of sinking will depend on the inclination, and, consequently, when both increase unduly in reference to the speed of the vessel, the proper mode of restoring the equality between the rates of expenditure and progress (the bottom of the sea being in general a level) is—not to retard the delivery of the cable—but to accelerate the speed of the vessel, until, by an extension of the inclination of the cable, the rate of its sinking becomes again equal to that of its being laid. This particular velocity of laying, determinable by the specific gravity of the cable, is the greatest that, in regard to economy, is needed; but in respect to circumstances connected with the unknown irregularities of the bottom of the sea, it is not desirable that this velocity should be reached, but that there should be an excess of cable lest it should get strained in its resting place. This, however, is on the supposition that no machinery is provided to pay out the cable faster than the ship moves. If this is secured, is there any reason why the vessel should not proceed at the greatest possible speed consistent with a safe unwinding of the coil, and a proper inclination of the cable? To so increase the speed of vessels, or to so lessen the specific gravity of the cable, either in itself or by means of floats, as to allow it to be laid out nearly on a level, would not, I think, be desirable, although abundance of slack should be provided, for there is no knowing in what irregular manner it may chance to sink, occasioning, perhaps, a great superfluity in some places where not needed, and a tightness in other places where a strain may be very prejudicial. It would also be exposed in a greater degree to the action of currents. The *beau ideal* of the subject would be a stronger and a heavier cable, to secure, among other objects, a more rapid sinking out of the way of currents, a corresponding increase in the speed of the vessel, a winding of the cable upon reels instead of coils, and the *Great Eastern* to cope with all these augmented difficulties in the case.

I am, Gentlemen, yours, &c.,

BENJAMIN CHEVERTON.

RAILWAY SIGNALS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I beg leave to suggest a plan for diminishing in some degree railway accidents, by causing the advancing train to signal itself when half a mile from the station. To effect this, I propose an iron rod, of convenient length and thickness, to pass vertically through the rail, leaving an inch or more projecting above it. To the lower end of this rod should be fixed a lever, the fulcrum of which might be at one-third the length, the rod being attached to the short end. The longer end of the lever is to be connected with a wire running on sheaves parallel to the rails, and terminating in the station, and this end of the wire might lead to a bell. The mode of operation is of a very simple nature; the wheels of the train passing over the projecting end of the rod, would press it down, and thereby raise the long end of the lever, which would pull the wire and give the signal. A spring or weight fixed to the long end of the lever would bring the rod back to its place after being pressed down by the wheels of the train.

I remain, Gentlemen, yours, &c.,

MACHINIST.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

BAKER, D. *An improvement in the manufacture of paper.* Dated Jan. 5, 1857. (No. 40.)

This consists in the application of sulphate of magnesia, with or without other ingredients, in the manufacture of paper.

HYDE, J. M. *Improvements in iron and wooden ships or vessels, and in the adaptation of the machinery for propelling the same.* Dated Jan. 5, 1857. (No. 43.)

The patentee constructs the after part of ships in a somewhat similar manner to that patented by him 29th Nov., 1854, but he adapts the ship for the reception of a propeller with two blades, the great difference between the present and former inventions being, that he increases the width of that part of the ship adjacent to the screw post throughout its entire length, so as to admit of the propeller being enclosed, when needful, by shutters or sliding plates within the lines of the ship.

DUMARCHEY, F. F., S. LEVY, and J. MAYER. *Improvements in wheels and axles for common road carriages.* Dated Jan. 6, 1857. (No. 44.)

The wheels of carriages are here fixed to the axletree. The invention also relates to a novel construction of the wheels by which they are allowed better to run over the road.

HOLMES, T. *Improvements in the preven-*

tion or consumption of smoke in furnaces and fire-places. Dated Jan. 6, 1857. (No. 46.)

The patentee mixes with the fuel a certain quantity of a neutral or acid salt of an alkali. He prefers to use common salt. He mixes the salt with the fuel in such proportion that every cwt. of coals is mixed with 3½ lbs. of common salt. He prefers to mix the half of this salt with the fuel, before the latter is charged upon the furnace, and he then distributes, by a spade or otherwise, the remaining half over the surface of the freshly charged fuel. He sometimes uses mixtures of one or more neutral or acid salts of the alkalies with lime, or baryta, or magnesia, or substances containing either of these.

RITTERBANDT, L. A. *Improvements in the treatment of substances containing earthy phosphates.* Dated Jan. 6, 1857. (No. 47.)

These consist in the treatment of coprolite, apalite, and other minerals containing the phosphates of lime and magnesia, and also bones, animal black, &c., for obtaining therefrom the above phosphates in a state of extreme division, and in a comparatively pure state. This treatment consists in dissolving the minerals or earthy part of the bones in dilute acids (preferring muriatic), and decanting the solution from the insoluble matters, and in precipitating the earthy phosphates from the solution so formed, by neutralising the acid, when the phosphates fall down as an insoluble powder.

BOUGLEUX, H. *Improvements in steam boilers.* Dated Jan. 6, 1857. (No. 50.)

In some boilers (such as Barran's cap surface) hollow vessels are introduced and fixed in the heating surfaces of the boilers. This invention consists in applying a comparatively small tube or pipe to each of such vessels in order that a tendency to a draft through shall be induced.

WRIGHT, C. E. *Improvements in preparing lubricating compounds.* Dated Jan. 6, 1857. (No. 51.)

This consists in combining soap, tallow, palm oil, venice turpentine, and water (in varying quantities or proportions).

BROOMAN, R. A. *Improvements in knitting frames.* (A communication.) Dated Jan. 6, 1857. (No. 52.)

This refers to the construction of a straight frame, or French loom, or machinery for the manufacture of knitted fabrics, and consists—1. In an arrangement for effecting the forming of the loops, and the knocking off of the work, the parts having a to-and-fro action in a straight line. 2. In constructing the frame with two sides, each having a row of needles, a row of loop-forming sinkers, and a row of knocking-over sinkers, so that two webs may be made at the same time. 3. In rendering the adjusting contrivance moveable, so as to have a periodical rotary movement. 4. In placing the thread guide over the carrier bar, and imparting a double movement to it. 5. In the construction of nippers actuated by cams for taking up the loop formed at the head of the selvage needle, at the same time as the knocking over brings the web to the front. 6. In an arrangement for narrowing or reducing the web.

TRATTLES, M. *Improvements in tools for cutting cylindrical and conical forms.* Dated Jan. 6, 1857. (No. 54.)

For large cylindrical articles the patentee avails himself of a lathe, but for smaller the tool is rotated by hand. The mandril is hollow to receive the wood to be cut, and the front end of the central opening is bell-mouthed. In the side of the mandril is a diagonal recess, deep enough to expose the interior of the mandril, and to permit of the edge of a flat blade projecting therein. These blades are secured by clamping screws, which permit of their adjustment or removal for sharpening. Rotary motion being given to the mandril, the wood is rapidly reduced.

CLAUS, C. F. *Obtaining tin or compounds of tin from the scraps or clippings of tinned sheet iron.* Dated Jan. 7, 1857. (No. 57.)

1. The patentee places the scraps or clippings in open pans, which are heated in any suitable manner, fills the pans with a solution of sulphuret of calcium completely covering the scraps, places on the top of the pans boxes with perforated bottoms in which he puts powdered sulphur; heats the pan till the liquid boils, and continues the boiling till the scraps are dissolved; more scraps are added till the liquid will dissolve no more. 2. He treats the solution of tin obtained as above by precipitating the tin as a sulphuret by means of an acid. 3. He obtains sulphuret of tin by the same process from solutions of stanno-sulphurets of alkalies.

MORRIS, J. *Improvements in washing machines.* Dated Jan. 7, 1857. (No. 58.)

This washing machine consists of a case or vessel in which is fitted a frame, the top edges of which are formed in a hollow curve, with a number of bearings for receiving the ends of rollers extending across the case. Over this frame another and correspondingly shaped frame, also provided with rollers, is fitted. The lower frame is stationary, and the upper frame so fitted as to be rocked. The upper roller frame is connected by stays to a transverse bar, and held suspended and steady by counterbalance weights outside the case, or otherwise.

SMITH, W. Y. *An improvement in sawing all kinds of wood.* Dated Jan. 7, 1857. (No. 61.)

This consists in causing the saw to move

up to and against the wood by means of a long screw passing through a piece connected with the saw.

HILL, H. C. *Improvements in screw and lifting-jacks, and in machines for lifting, pressing, and lowering.* Dated Jan. 7, 1857. (No. 62.)

This consists of a means of obtaining leverage by a combination of lazy-tong levers.

COOPER, G. P. *Improvements in the manufacture of shirt-collars.* Dated Jan. 8, 1857. (No. 63.)

The patentee takes several thicknesses of linen, and arranges them so that, when the collar is finished, the interlining shall lie over, and prevent the running from showing through the outside piece.

GOODMAN, J., A. MYERS, and L. GOODMAN. *Improvements in the manufacture of caps or coverings for the head.* Dated Jan. 8, 1857. (No. 64.)

This relates to caps, &c. (worn by youths and military men), and is designed for rendering them durable. It consists in permanently combining together any two kinds of material (whether oil-skin or other waterproof covering) with the cloth cover of the cap. They cover one half of the top and band part of the cap (at the front) with cloth, and the other part they form of oilskin and cloth combined, and of such size as to cover the entire cap. One half of the oil-skin is fixed to the foundation of the cap, and the other half, with the cloth attached, is moveable.

HUGHES, E. J. *Improvements in the manufacture and application of compounds resembling gutta percha and caoutchouc, from flour, fibrine, gelatine, and other vegetable and animal substances.* (A communication.) Dated Jan. 8, 1857. (No. 67.)

The patentee produces such compounds by combining fibrine, starch, gluten, or substances containing them, such as flour, with gelatine resin, gum resins, fats, oils, and substances containing tannin.

HARRIS, J. *An improved lock, and method of acting upon lock-bolts, latches, taps, and valves, railway and other signals, bells, and other like apparatuses.* Dated Jan. 8, 1857. (No. 68.)

This invention is described at page 275 of this number.

McDONALD, A. *Improvements in the manufacture of columns, pilasters, and other similar structures of granite, marble, porphyry, jasper, serpentine, sienite, and other stones capable of receiving a high polish.* Dated Jan. 8, 1857. (No. 69.)

These relate to means by which, when such structures have to be formed of several pieces, each part may be more correctly worked in relation to the others during formation, so that, when the parts are ultimately fixed in position, they may appear as one solid mass, or as nearly so as possible.

BALL, T., and J. WILKINS. *Improvements in manufacturing looped fabrics, suitable for the making of gloves and other articles.* Dated Jan. 8, 1857. (No. 71.)

When making warp looped fabrics, by this invention, a warp of woollen yarn and a warp of spun silk yarn are used. The warp threads of yarn are looped on to the needles to make the woollen fabric, whilst the yarns of spun silk, which are to be on one surface, and are to be formed into a pile, or raised into a nap or fleece after the fabric has been milled or felted, are not looped on to the needles. When making knit looped fabrics, the woollen yarn is laid on to and sunk between the needles, so as to produce a woollen fabric; and the spun silk yarn is worked in as a pile, or so as to be raised after the fabric has been milled or felted. The fabrics thus produced are to be milled or felted and raised in the ordinary manner.

RUSSELL, J. J., and J. B. HOWELL. *Improvements in the manufacture of steel tubes, applicable to the flues of steam boilers and other uses.* Dated Jan. 8, 1857. (No. 72.)

This consists in causing the steel, after it has been converted in the ordinary manner, to be rolled into sheets of the width, length, and thickness required, then to cut the edges into the proper form according as a lap or butt weld is to be made. The sheets are then turned up, so that the edges meet or nearly so, raised to a welding heat, and welded by external pressure by dies or by grooved rollers.

TURNBULL, R. *Improvements in cradles for heaving up ships.* Dated Jan. 8, 1857. (No. 75.)

This invention is described at page 276 of this number.

DAY, J. R., and J. L. HINKS. *Improvements in constructing and attaching knobs and handles of drawers and doors, cupboard turns, and other such like articles.* Dated Jan. 9, 1857. (No. 76.)

This cannot be described in detail without engravings.

JOHNSON, J. H. *Improvements in machinery or apparatus for sewing or uniting and ornamenting fabrics.* (A communication.) Dated Jan. 9, 1857. (No. 77.)

This relates to a peculiar construction and combination of mechanism for embroidering or ornamenting fabrics by stitches, which mechanism may also be employed in the operation of sewing or uniting fabrics together, and also to certain combinations of mechanism for preparing designs of various kinds to be embroidered on fabrics.

SMITH, R. *Certain improvements in the manufacture of corded skirtings and corded petticoats.* Dated Jan. 9, 1857. (No. 78.)

This consists in the manufacture of a corded fabric to be worn as skirtings or petticoats, having the cords or ribs thrown up on the surface or face of the cloth, that is, upon one side only, whilst the under surface or back is without the cords. This is accomplished in the weaving by dividing the yarn into two equal parts, to make warps, one considerably longer than the other, and so arranged that the longer warp covers the corded surface, and binds or holds the cords upon the surface of the cloth, and the shorter warp is used to form the plain back beneath the ribs or cords, both warps being woven together between the ribs or cords.

JOHNSON, J. H. *Improvements in the application of the electro-type or galvano-plastic processes.* (A communication.) Dated Jan. 9, 1857. (No. 79.)

This consists in the application to the electro-type process of a shell or skeleton made of platinum or other metal, and introduced into the mould as an insoluble electrode in lieu of the soluble anode described in the provisional specification of the inventor lodged the 21st Dec., 1854.

BAGSHAW, J., and J. P. HARRIS. *Improved medicinal mixtures, adapted for curing diseases of cattle.* Dated Jan. 9, 1857. (No. 83.)

This consists in the use of—1. Copper dissolved in aqua fortis in about equal quantities. This is adapted for curing "foot-rot" in sheep. 2. To 1 gall. of tobacco liquor add 2 pints of spirits of turpentine, ½ pint of spirits of wine, 1 oz. of salammoniac, 2 oz. of soft soap, and 2½ drams of halken root. This is for curing "scab mange." Other mixtures are included.

GRATRIX, J. and C. *Improvements in looms.* Dated Jan. 10, 1857. (No. 84.)

This relates to self-acting temples for looms, and consists—1. Of improvements in those known as the roller and box, for which Messrs. Kenworthy and Ballough obtained a patent dated Jan. 14, 1841.

BRETHON, L. J. *Improvements in machinery for manufacturing draining pipes, bricks, tiles, and all other similar plastic articles.* Dated Jan. 10, 1857. (No. 85.)

This machinery is applied to the manufacture of solid or perforated bricks, &c., having a regular cross section. A vertical screw revolves in an upright cylinder. A rotatory motion is given to the helix, by horse or steam power, and the clay is thrown into the upper box of the cylinder as it is dug from the ground, without any other preparation than that of being mixed with water; it is ground, mingled, and freed from hard or filamentous substances, and finally forced down through side-moulding apertures.

KYLE, D. D. *A method of retarding or stopping railway trains and carriages, applicable also to carriages on common roads.* Dated Jan. 10, 1857. (No. 86.)

This invention requires engravings to illustrate it.

CHANTER, J., and J. WAKEFIELD. *Improvements in the fire-boxes or furnaces of locomotive engine boilers.* Dated Jan. 10, 1857. (No. 88.)

To admit of coal being burned in locomotive boilers, and yet prevent smoke, the water spaces at the sides, back, and front are made with tubular openings through them to admit air to the fire, and also into the fire box to mix with the products rising from the fire. To maintain a draught through the flues when the locomotive is still, a steam pipe with a cock admits steam from the boiler to the chimney. To keep the fire free from clinkers, &c., reciprocating or moving bars are used.

HODGSON, J. *An improvement in constructing wrought iron masts, yards, bowsprits, and other ships' spars.* Dated Jan. 10, 1857. (No. 89.)

The several parts to be used in making a mast, yard, or other ship's spar, are to be bent to the curve desired, the vertical edges being formed into flanches outwards, so that when they are fixed together the flanches will form outside longitudinal ribs.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

GOSSAGE, W. *Improvements in the manufacture of sulphuric acid, and in the construction of apparatus used for such manufacture.* Dated Jan. 5, 1857. (No. 41.)

The height of the chambers employed in the above manufactory is greatly increased, and the proportionate horizontal area diminished; and the gases employed are passed through the chambers vertically. Showers of liquid sulphuric acid, or of liquid nitro-sulphuric acid, or of water, are used in such chambers falling from the upper part to assist in mixing and condensing gases and promoting the formation of sulphuric acid from such gases. The invention also comprises the combined use of towers containing coke or other suitable material in conjunction with chambers for the manufacture of sulphuric acid, such towers being used for the absorption, by means of strong sulphuric acid, of nitrous gas or nitrous acid from the uncondensed gases passing off from such chambers in the ordinary course of manufacture, and other towers being used for the preparation of strong sulphuric acid by the evaporative action of hot sulphurous acid gas passing through such towers. The inventor also

employs in the construction of sulphuric acid chambers certain natural siliceous sandstones, or somewhat porous stones, the pores of which stones are previously filled up by melted sulphur.

OLDHAM, J. *An apparatus for closing the supply cocks of gas burners.* Dated Jan. 5, 1857. (No. 42.)

This relates to certain methods of employing electro-magnetism as a means of simultaneously closing the supply cocks of a number of gas lamps.

KENNARD, T. W. *Improvements in metallic piles.* Dated Jan. 6, 1857. (No. 45.)

The inventor constructs piles, whose transverse section is in the form of a cross, or which may consist of three or more leaves or plates connected together. The outer edges of these leaves are thicker than the other parts, or they are made with a rib or bead.

TRIPE, J. D. *Improvements in mechanism for affording increased security to valves, taps, or other apparatus used for regulating or interrupting the flow of gases, vapours, and liquids.* Dated Jan. 6, 1857. (No. 48.)

These consist in the use of one or more locking apparatus applied to valves, syphons, sluice gates, the plugs of taps, &c.

MABERLY, F. H. *Improvements in constructing receptacles for sewerage, for separating the fluid from the solid portion thereof, and for purifying, storing, and carrying away the same.* Dated Jan. 6, 1857. (No. 49.)

The inventor proposes to form large arched vaults, and on the top of these to place funnels containing gravel or any deodorising substance, through which the greater portion of the water that may be in the filth within the vaults will be forced to come out comparatively clear. Tubes will be connected to the lower part of the vaults, through which the filth may be removed from the vault and be conveyed into closed cylinders or other receivers.

DUNBAR, A. A. *Improvements in lifting, lowering, and disengaging ships' boats.* Dated Jan. 6, 1857. (No. 53.)

The outer ends of the two boat's davits are connected by a longitudinal rod, and this rod has suspended from it, near one end, a snatch block, with an open or hinged side, for the free entry of the tackle or fall, as required. Each davit carries a complete purchase tackle. The fall from one tackle passes direct to where the haulage is applied, whilst the other is brought to it along beneath the connecting rod of the davits, and then passed over the snatch block, the two being worked together. The disengagement is effected by a detent contrivance at each end of the boat, the two being connected by a rod along the boat's bottom.

COOK, C. *Improvements in apparatus for generating draughts in chimneys and for other purposes.* Dated Jan. 6, 1857. (No. 55.)

This apparatus must be exposed to the wind. It consists of a kind of fan placed in a cylinder. The blades are on a vertical spindle supported in a step on a cross bar, and above by a cross bar at the top, beyond which it projects. To produce rotation a fan wheel is placed on the top exposed to the action of the wind. The blades are covered, so that one side is hollow, and catches the wind, while the back of a blade on the opposite side is so disposed as to throw off the wind!

HARGREAVES, B., and A. MOSEDALE. *Certain improvements in looms for weaving.* Dated Jan. 7, 1857. (No. 56.)

This consists in making the connecting arms by which the motion of the crank shaft is communicated to the slay in two parts, capable of sliding within or upon each other, and connected by a stop piece held by a spring. If the shuttle fails to box, a stop rod acts on the stop piece, and disconnects the two parts, allowing the crank shaft to revolve without beating up the lay.

PILKINGTON, P., and T. ENTWISTLE. *Improvements in machinery or apparatus for washing, cleaning, agitating, grinding, polishing, or mixing various materials.* Dated Jan. 7, 1857. (No. 59.)

This consists in giving to a barrel-shaped vessel a compound eccentric or serpentine and circular made motion, for powerfully agitating its contents.

CURTIS, W. J. *Improvements in railway axletree boxes.* Dated Jan. 7, 1857. (No. 60.)

To prevent the passage of grease out of the axle box, and dust and dirt getting in, a disc of flexible material is fixed at its circumference to the axle box. The axletree passes through its centre.

NEWTON, R. *A new or improved manufacture of metallic boxes.* Dated Jan. 8, 1857. (No. 65.)

The improved box consists of two pieces of tube, one sliding in the other, the inner piece having a portion cut away.

PRESTWICH, W. *Improvements in gas burners.* Dated Jan. 8, 1857. (No. 66.)

The inventor makes a small cap to fit on the ordinary gas burner; the top of it he perforates, or he makes the burner itself with the top part perforated.

LAWES, T. *A machine or apparatus to be used in cleansing, purifying, and drying animal and vegetable substances.* Dated Jan. 8, 1857. (No. 70.)

This consists in constructing for the above purpose a conical or cylindrical vessel, mounted upon a hollow base or plinth, and surrounded by a steam-tight case communicating with the interior in

such manner as to leave an intervening space in the form of a concentric channel of suitable dimensions for the reception of the articles to be operated upon, within which also a series of beaters are caused to revolve through mechanism in gear with an engine.

KEATES, T. W. *Improvements in the treatment of Rangoon naphtha and other varieties of petroleum.* Dated Jan. 8, 1857. (No. 73.)

The object here is to obtain certain fluid or solid products valuable in commerce. The improvements consist—1. In subjecting the crude materials to the action of steam under particular conditions, for the purpose of separating the most volatile of their constituents. 2. In distilling the residue in a distillatory chamber of a peculiar construction.

ROBERTS, J. *Improvements in the stoppering or closing of jars, bottles, and other vessels, applicable also to the joining of earthenware and other pipes.* Dated Jan. 8, 1857. (No. 74.)

The inventor avails himself of the yielding property of cork, soft wood, India-rubber or other analogous substance, a band of which he adapts to the neck or stopper, or to the ends of pipes.

CARRUTHERS, J. A. *Improvements in the mode or method of forming the lease or shed in sizing, warping, or weaving.* Dated Jan. 9, 1857. (No. 80.)

Instead of forming the lease or shed by hand, the inventor fixes on a bar a number of washers corresponding with the number of threads in the warp; every alternate washer being a little less in diameter, causes each alternate one to project on the surface, thus forming a kind of porcupine cylinder, which he fixes on bearers, and places in any convenient position under the warp threads so as to be just in contact with them. The cylinder being turned by a handle for the purpose, each projecting washer will catch every alternate thread, and thus separating them, forms the lease or shed at once.

HARDACRE, J. *Improvements in machinery or apparatus for preparing cotton, wool, and other fibrous substances to be spun.* Dated Jan. 9, 1857. (No. 81.)

This relates to improvements in roving and slubbing machines, and consists—1. In placing the horizontal bobbins transversely across the machine. 2. In raising and depressing the creel by racks and pinions, or slides and balance weights, so that the operative may reach the higher portions of the creel without difficulty. 3. In a flyer, which consists of a double tube held together by arms, one of which guides the roving or slubbing from one tube to the other; the said flyers work vertically, and are furnished with wharves, pulleys, or toothed wheels, to put them in motion. 4. In making the frame either as a single or double one.

GIBBS, J. *Improvements in extracting gold and silver from their matrices and from other substances or materials with which they are combined, mixed, or associated.* Dated Jan. 9, 1857. (No. 82.)

This consists—1. In washing the diluvial sands and gravels so as to obtain about one-thirtieth part of the original bulk after being freed from the large stones, which process is called concentrating. 2. In re-grinding or re-crushing this material so concentrated, the second crushing machine being at the same time charged with quicksilver. The concentrated material is ground so fine that, while passing and repassing over the surface of the quicksilver, it resembles mud; and for the more perfect grinding, and to carry off the muddy substance when so formed, water is caused to flow through the crushing machine. The concentrated material is sometimes smelted instead of ground. A small quantity of nitre is, from time to time, put into the second crushing along with the quicksilver machine whilst the process is being carried on.

PROVISIONAL PROTECTIONS.

Dated July 17, 1857.

1980. Charles Barlow, of Chancery-lane. An improved brick-making machine. A communication.

Dated July 23, 1857.

2024. Charles Fréderic Vasserot, of Essex-street, Strand. An apparatus for moulding candles. A communication from F. P. Morane, of Paris.

Dated July 27, 1857.

2042. Augustin Mortera, of Paris, civil engineer. Improvements in coupling carriages on railways.

Dated July 31, 1857.

2084. Isaac Moll, of Cologne, Prussia. An economical fire regulator.

Dated August 5, 1857.

2116. Sebastien Botturi, of Paris. An apparatus and oven for the carbonization and distillation of all animal and vegetable matters.

Dated August 8, 1857.

2136. George Collier, William Noble, and Ward Holroyd, all of Halifax, York, manufacturers. Improvements in cutting, shaping, and planing wood, and in the tools and apparatus employed therein.

Dated August 17, 1857.

2180. John Abraham, of Birmingham, machinist. For a new or improved gauge for gauging wire and sheet metal, and for other like purposes.

2182. Peter Carmichael, of Dens Works, Dundee. Improvements in calendering and mangling cloth.

2184. François Xavier Poznanski, of Craven-street, Westminster, doctor of medicine. An improvement in instruments for ascertaining and indicating the state of the pulse, which improve-

ment is also applicable to other instruments in which fluids are required to circulate or work in tubes of small bore.

2186. John Grist, of Islington, engineer. Improvements in mash tuns and in apparatus to be employed therewith, which apparatus is also applicable to the heating and keeping up of a continuous circulation of liquids in any vessel to which it may be connected.

Dated August 18, 1857.

2188. Joseph Coupe, of Preston, manufacturer. Improvements in power looms.

2190. William Henry Miller and Henry Edward Skinner, of Shadwell, engineers. Improvements in rotary engines and pumps.

2192. Benjamin Lupton, Robert Jackson, Daniel Dean, and John Holden, all of Burnley, Lancaster, machinists. Certain improvements in power looms for weaving.

Dated August 19, 1857.

2195. Sigismond Rosenthal, of Red Lion-square, Holborn, artist. Printing on both sides of a sheet of paper by a single impression on an ordinary lithographic or other press.

2196. Samuel, James, and Thomas Bottomley, of Buttershaw, York, stuff manufacturers. Improvements in machinery acting upon, and in connection with, rotary shuttle boxes, for weaving checks, plaids, figured and fancy goods.

2197. Arthur Wall, of the East India-road, Poplar, chemist. Improvements in amalgamating metals.

2198. Arthur Wall, of the East India-road, Poplar, chemist. Improvements in coating metallic surfaces.

2199. Alexis Jean Dessales, of Paris. An improvement in lamps for railway carriages, ships' cabins, and other oil lamps.

2200. Pier Alberto Balestrini, of Brescia, Italy, now of Mark-lane, gentleman. A new method of, and apparatus for, sounding at sea and in other waters.

2202. Charles Fréderic Vasserot, of Essex-street, Strand. A smoke consuming grate. A communication from Messrs. D. de Luzy and H. G. de Chateauneuf, of Paris.

2204. Ferdinand Potts, tube manufacturer, of Birmingham. Certain improvements in the mode of cutting out, forming, and finishing certain descriptions of metallic tubes, part of which is also applicable for other such like purposes.

2206. Robert Clark Gist, gentleman, of Cannon-street, City. Improvements in the manufacture of manure. A communication.

2208. James Murdoch Napier, of Vine-street, York-road, Surrey, engineer. Improvements in apparatus for paying out submarine telegraph cables.

Dated August 20, 1857.

2209. Robert Lawrence Brooke, of Keppel-street, Russell-square. Improved method for discharging, paying out, and submerging electric telegraph cables, wires, or ropes, or such like articles from ships or vessels of any description.

2210. Theophilus Gough, of Bristol, engineer, and Joshua Margerison, of the same city, gentleman. Improvements in breaking apparatus for vehicles used on railways or on other roads or ways, parts of which are applicable for communication between guards and drivers of trains.

2211. John Gedge, of Wellington-street South, Strand. Improved means of heating buildings and of facilitating the escape of smoke and gases therefrom. A communication from X. Lorentz.

2212. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. A new method of defecating sugar and other saccharine matters, and of refining or rectifying alcohol. A communication.

2215. Robert Taylerson, of Tryons-terrace, Hackney. An improvement in metal ships and vessels.

2216. Daniel Messmore, of New York, merchant. An improved method of dressing mill stones for hulling rice and other grain having hulls or husks. A communication.

2217. Thomas Ingram, of Bradford, York, foreman. Improvements in railway breaks.

Dated August 21, 1857.

2218. William Kemble Hall, engineer, of Cannon-street, City. Improvements in apparatus for measuring and registering the speed and leeway of ships, and indicating the distance accomplished. A communication.

2219. Joseph Glover, of Liverpool, photographer, and John Bold, also of Liverpool, watch maker. An improved material for transfer printing.

2220. John McMaster, farmer, of Caldons, and William Wilson, of Whithorn, both in Wigtown. Manufacturing liquid farm manure and rendering it as efficient as any artificial manure, at a small expense to the farmer.

2221. Victor Hippolyte Laurent, of Plancher-les-Mines, France, engineer. A new improved machine for forging nails and other similar articles.

2222. Peter Ashcroft, of Dalston, Middlesex, civil engineer. Alarm signals for the prevention of accidents on railways.

2223. Henry Cartwright, of the Dean, Broseley, Shropshire, farmer. Improvements in the construction of steam engines.

2224. John Dauglish, of Great Malvern, M.D. Improvements in the preparation of dough.

2226. Henry Clarke, of Chancery-lane, clerk. Improvements in the lines of steam vessels, and in the method of propelling the same.

Dated August 22, 1857.

2229. George and William Steell, of Kew-road, Richmond, nursery florists. The better construction of a double backed double boiler for heating with hot water, churches, horticultural buildings, mansions, theatres, &c., &c.

2230. Frederick Albert Gatty, of Accrington, manufacturing chemist. Improvements in the manufacture of chlorine and sulphuric acid.

2231. Thomas Settle, manufacturer, of Bolton-le-Moors. Certain improvements in looms for weaving.

2232. John Pinchbeck, of Katesgrove Iron Works, Reading, Berks, civil engineer. An improvement in screens for dressing or separating corn or other grain.

2233. Ludvig Levison, of Birmingham, merchant. Improvements in mechanical purchases, to be employed for hoisting purposes, and for extracting roots and stumps of trees. A communication.

2234. Perry G. Gardiner, of New York, mechanical engineer. A new and useful process in the treatment of cast-steel while passing from the molten state into that of being hardened or tempered, and which, with certain variations, is applicable to the making of tools, instruments, axes, wheels, or ingots.

Dated August 24, 1857.

2235. François Jules Blanc, of Paris, gentleman. An improved tire for the wheels of railway carriages, engines, and tenders.

2236. George Daniel Davis, of Saint Leonard's-road, East India-road, ship caulker. Improvements in the construction and in the method of working windlasses.

2237. Alfred Vincent Newton, of Chancery-lane. Improvements in temples for looms. A communication from F. C. Keim, of Thann, France.

2238. Thomas Rickett, of the Castle Foundry, Buckingham. Improvements in machinery for sowing seeds and manure.

2239. Alfred Hamilton, of Oxford-square. Im-

provements in the construction of, and in mooring buoys, beacons, floating lights, and other floating vessels and bodies.

2240. Samuel Fox and Julian Wilfred Slater, of Sheffield, analytical chemists. An improved metallic compound applicable to the manufacture of various useful articles.

Dated August 25, 1857.

2241. Thomas Macauley, of Shoreditch, varnish manufacturer. Improvements in apparatus for condensing the noxious vapours arising from varnish making and other like manufactures.

2244. Edward Riley, of Droylsden, near Manchester, weaver. Improvements in looms.

2245. George Wirgman Hemming, of Belsize-road, St. John's Wood. Improvements in apparatus employed in delivering submarine telegraph cables from ships.

2246. Charles Clement James, of Norwood Green, gentleman. Improvements in propelling vessels.

2247. William Nicholls, of Chippenham, Wilts. Improved apparatus for warming milk.

2248. Henry Parry, of Croydon. Improvements in the construction of rails for railways or tramways.

2249. James Ronald, of Liverpool, merchant. Improvements in laying or depositing submarine telegraph cables.

2250. John Penn, of Greenwich, engineer. An improvement in apparatus for taking the thrust of screw and submerged propellers.

2251. John Jervis Tucker, Captain R.N., of Sheerness, and George Blaxland, superintending engineer of H.M. Dockyard, Sheerness. Improvements in steam boiler and other furnaces.

2252. Werner Staufen, of Baker-street, manufacturer. An improved method of treating agava americana or mexican grass, and the manufacture of a new fabric therefrom.

2253. Alfred Vincent Newton, of Chancery-lane. Improvements in machinery for preparing, roving, spinning, and twisting fibrous substances. A communication from E. Hubner, of Mulhouse.

2254. Alfred Vincent Newton, of Chancery-lane. A mode of varying the length and reversing the direction of the throw of eccentrics, applicable to the reversing gear of locomotives, and expansion gear of other steam engines, and to other purposes. A communication.

2255. Philip Hill, of Manchester, weaver, and John Moore, of Salford, swallware manufacturer. Certain improvements in machinery or apparatus for cutting velvets or other similar piled fabrics.

Dated August 26, 1857.

2256. John Gedge, of Wellington-street South, Strand. Improvements in the manufacture of soap. A communication.

2257. Thomas Forsyth, of Manchester, engineer. Improvements in machinery for raising, lowering, traversing and compressing.

2258. William Hargreaves, of Bradford, York, machine wool comber. Improvements in screw gills for preparing wool and other fibrous substances.

2259. Thomas Smith, of Manchester, silk finisher. Improvements in machinery or apparatus for embossing woven fabrics, paper, leather, and other materials.

2260. Alfred Vincent Newton, of Chancery-lane. Improved machinery for kneading dough. A communication.

2261. Henry Elvin, of Castle Acre, Norfolk, blacksmith. Improvements in governors for steam and other engines.

2262. Alfred Vincent Newton, of Chancery-lane. Improved means of operating slide valves for the induction and eduction of steam in reciprocating steam engines. A communication.

2263. James Goodwin, of Milton, Stirling, N.B., dyer, and Andrew Boyd, of the same place, merchant. Improvements in cleansing printed cotton and silk fabrics from colouring matters.

2265. Thomas Brown, of Fenchurch-street. Improvements in machinery for raising and lowering weights.

Dated August 27, 1857.

2267. William Harling, John Matthew Todd, and Thomas Harling, of the Calder Foundry, Burnley, Lancaster, machine makers. Improvements in looms.

2269. Alfred Vincent Newton, of Chancery-lane. Certain improvements in bakers' ovens. A communication.

2271. Robert Aytoun, of Edinburgh, writer to the signet. Improvements in safety cages or apparatus for mines.

Dated August 28, 1857.

2273. Andrew Shanks, engineer, of Robert-street, Adelphi. Certain improvements in machines for shaping and cutting metals and other substances.

2275. William Smith, of Liverpool, oil and tallow refiner. An improvement in the manufacture of size made from gelatine.

Dated August 29, 1857.

2277. Robert Whittam, of Accrington, engraver. Improvements in machinery or apparatus for ruling upon metallic rollers or cylinders for printing calico and other materials.

2279. John Fisher, of Carrington, Nottingham, lace manufacturer. An improvement in the manufacture of bobbin net or twist lace.

Dated August 31, 1857.

2281. Joseph Gilbert, of Evesham, Worcester, machinist. An improvement in combined thrashing machines.

2283. Philippe Roehrig, of Paris, manufacturer. A new or improved fabric to be used for manufacturing petticoats and other parts of women's dress.

2285. Henry Brinsmead, of Ipswich, machinist. An improvement in the beaters of thrashing machines.

2287. Lionel Gisborne and Henry Charles Forde, of Duke-street, Adelphi, civil engineers. Improvements in apparatus for paying out electric telegraph cables.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," September* 15, 1857.)

1231. J. H. Johnson. Improvements in apparatus for preventing collisions at sea. A communication.

1233. R. Leake and M. Sykes. Improvements in consuming smoke and generating heat in furnaces of steam engine or other boilers, also heating the feed water of the said boilers, thereby economizing fuel to a great extent.

1241. J. Davy and W. Bentley. Certain improvements in looms for weaving fibrous substances.

1246. W. E. Wiley. Improvements in boxes or cases for containing needles, leads for pencils, pens, and other articles.

1253. T. B. Moseley. An improved pneumatic holder, adapted for photographic and other purposes.

1255. W. E. Wiley. Improvements in ever-pointed pencils.

1256. J. Leslie. Improvements in apparatus for ventilating buildings.

1259. G. Travis. Improvements in apparatus used in the manufacture of cheese.

1265. J. T. Pitman. An improvement in the construction of curry-combs. A communication.

1270. W. Wilkins. An improved method of laying submarine telegraph cables.

1274. J. P. Becker. Improvements in the mode of silvering animal, vegetable, and mineral objects.

1280. H. Hogarth. An improved apparatus for raising and floating vessels or other heavy bodies.

1281. M. Semple. An improved pipe, tube, or stem.

1291. D. Morrison. A new or improved manufacture of rollers or cylinders for printing fabrics.

1296. L. C. Dolléans. Improvements in ornamenting porcelain, china, opal-glass, and similar products, by lithographic chromo-lithographic printing and gilding.

1324. J. D. Mucklow. Certain improvements in the manufacture of rollers or cylinders to be employed for printing calico and other surfaces.

1339. R. A. Brooman. Improvements in the preparation of steel, and in the steeling or manufacture of tyres, shafts, axles, and other forgings. A communication.

1342. W. Massey and J. Smith. Improvements in machinery for ploughing and cultivating land.

1343. W. Massey. Improvements in engines for the cultivation of land by steam power.

1351. R. D. Kay. Improvements in machinery or apparatus for printing woven or felted fabrics. A communication.

1477. L. D. Aubert. Improvements in fastenings for securing rails in the chairs.

1492. H. Crompton. Certain improvements in machinery or apparatus for stretching woven fabrics.

1498. V. Bacqueville-Pieters. Improvements in outside blinds or shades for windows, doors, and other places.

1522. P. A. de Fontainemoreau. Improvements in the construction of smoke-consuming furnaces, applicable to boilers. A communication.

1611. P. A. de Fontainemoreau. Improvements in the construction of axle bearings. A communication.

1703. T. Ward. An improvement or improvements in the manufacture of strip and hoop iron.

1707. G. W. Charlwood. Improvements in machines for mowing and reaping. A communication.

1831. J. Nickless. A new or improved railway chair.

1841. M. A. Laurent. A new antiseptic composition.

1961. T. M. Smith. Improvements in the preparation of materials applicable to the manufacture of candles.

1965. J. H. Quick. An improved hat.

1986. A. Upward. An improvement in the manufacture of coke.

2018. H. Doulton. Improvements in the manufacture of earthenware drain and other pipes.

2053. W. Hirst. Improvements in manufacturing felted fabrics.

2130. J. R. Scartliff. Certain improvements in mathematical instruments.

2136. G. Collier, W. Noble, and W. Holroyd. Improvements in cutting, shaping, and planing wood, and in the tools and apparatus employed therein.

2182. P. Carmichael. Improvements in calendering and mangling cloth.

2188. J. Coupe. Improvements in power looms.

2229. G. Steell and W. Steell. The better construction of a double backed double boiler for heating with hot water, churches, horticultural buildings, mansions, theatres, &c., &c.

2249. J. Ronald. Improvements in laying or depositing submarine telegraph cables.

2250. J. Penn. An improvement in apparatus for taking the thrust of screw and submerged propellers.

2258. W. Hargreaves. Improvements in screw gills for preparing wool and other fibrous substances.

2263. J. Goodwin and A. Boyd. Improvements in cleansing printed cotton and silk fabrics from colouring matters.

2265. T. Brown. Improvements in machinery for raising and lowering weights.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1953. Henry Lund.
1985. Charles Wentworth Forbes.
1978. John Norton.
1994. Henry Crosley.
2001. William Bramwell Hayes.
2009. Samuel Collins.
2017. Samuel Crabtree.
2064. William Palmer Surgey.

LIST OF SEALED PATENTS.

Sealed September 11, 1857.

708. George Mountford.
721. Samuel Laurence Taylor and Thomas Eaton Rolfe.
727. John Wheatman and John Smith.
731. Martin Nunn.
747. Sir Francis Charles Knowles, Bart.
754. William McCulloch and Thomas Kennedy.
779. Henry Hall.
805. Thomas Howard Head and Joseph Wright.
809. William Heap.
819. Robert Hanham Collyer.
907. Alfred Vincent Newton.
921. Alfred Vincent Newton.
979. William Sullivan Gale.
1007. William Clark.
1243. Adolphe Louis Cauville.
1313. Francis Watkins.
1715. John Henry Johnson.
1929. Richard Hornsby, jun.

Sealed September 15, 1857.

743. Nathaniel Jones Amies.
768. Joseph Lewis.
774. Marie Amedée Charles Mellier.
786. John Chedgey.
800. Matthew Augustus Crooker.
804. Bewicke Blackburn.
832. Pearson Hill.
838. Robert Cassels and Thomas Morton.
842. John Radcliffe, James Fearnehough, and Joseph Mather.
882. Jean Eugène D'Arcet.
998. William Oxley and Hugh Strath.

1022. John Blythe Robinson.
1056. John Henry Johnson.
1086. Peter Armand le Comte de Fontainemoreau.
1210. John Henry Johnson.
1518. Charles Fleet.
1854. Matthew Clark.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

We have received various communications and suggestions respecting the laying of submarine telegraphic cables, but as none of them appear to be very simple and efficacious, we cannot for the present afford them space. We may perhaps select the best of them for publication hereafter.

Boileau.—We have no information respecting the paper on Boilers to which you allude.

T. Moy.—We should prefer the MS. *in extenso.*

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1781.] SATURDAY, SEPTEMBER 26, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

KNOX AND ROBSON'S GAS REGULATORS.

Fig. 4.

Fig. 3.

Fig. 1.

Fig. 2.

KNOX AND ROBSON'S *GAS REGULATORS.*

MESSRS. A. KNOX AND T. ROBSON, engineers, *of Mile-end* and Aldersgate-street respectively, have obtained a patent for an improved *gas regulator* which possesses several merits. It is formed with an external case with apertures for admitting gas from a main, and for allowing it to escape to the burners. Inside the case is a chamber fitted with a conical valve, suspended as hereafter stated. The inlet aperture leads directly into this chamber, and no gas can pass through the regulator without entering it. Over this chamber, and at a convenient distance between it and the top of the case, is fitted a diaphragm of oiled silk. To the centre of the diaphragm is affixed a tapped nut, through which is inserted a screwed spindle, the bottom of which terminates in an eye, on which is hooked the valve before named, or it may be made in a piece with the spindle. Upon the top of the diaphragm is placed a weight, which is regulated according to the pressure at which the gas is to be allowed to escape from the regulator.

Fig. 1 of the engravings annexed is a section of the improved regulator. A, is the socket in which the inlet pipe is screwed for the admission of the gas from the meter or supply pipe into the compartment A′. B, is a similar socket, in which the outlet pipe is screwed in communication with the compartment, B′, and leading to the burners. C, is a conical valve fitted in a conical seat, *a*, in the partition, *b*, which separates the chamber, A′, from the chamber, B′. The valve, C, which is made of brass, bismuth, or other suitable material, is connected or hooked to the threaded spindle, F. D, is the diaphragm which is made of oiled silk or other suitable material prepared in such a manner as to render it impermeable to, and not liable to be injured by the action of the gas. It is connected to the spindle, F, by means of the nuts, washers, or discs, E, E, which are first fixed to the diaphragm, and the spindle, F, screwed through them. On to the upper end of this spindle, F, the weight, H, is screwed. G, is a cover or moderator, made of gutta percha, attached by means of a groove, turned on the outside edge of the compartment, B′, so as to be air-tight. The resistance of the air as it passes out or returns through the small space, *c*, around the spindle, F, modifies or restrains any sudden pressure upon the diaphragm, and prevents the sudden opening or closing of the valve, C. Between the diaphragm and the compartments they insert a piece of thin gutta percha to preserve the silk. The diaphragm is secured round the edge of the compartments by means of one or more bands or rings, I, I, of vulcanized India rubber, placed in grooves in the edge of the compartment. K, is a metal cover inclosing the upper part of the apparatus.

The gas enters by the pipe, A, into the compartment, A′, and passes by the valve, C, into the compartment, B′, and from thence along the pipe to the burners; the apertures in the burners not being large, and only allowing a small quantity of gas to escape, compared with that which should flow through the pipe, causes the gas to accumulate in the pipe and in the compartment, B′, where it exerts a pressure on the diaphragm greater than that due to the weight, H, and parts connected with it. The diaphragm is consequently raised, and, taking with it the spindle, F, and valve, C, partially closes the aperture in which the valve, C, is placed, and thus regulates the supply of gas passing through the apparatus to the burners. Should the pressure in the compartments, A′, be lowered, the pressure in the compartment, B′, will be lowered also; and the weight of the diaphragm, together with the parts connected thereto, fall by their own gravity, whereby the valve, C, is lowered from its seat, thus fully opens the aperture through which the gas is admitted, and by these means a regulated constant supply is kept up to the burners.

At fig. 2 is shown the valve, C, placed immediately over the inlet pipe, A. At fig. 3 is shown an arrangement of the regulator where two equilibrium valves, C C′, are used, connected together by a rod or link. In figs. 2 and 3 the valve, spindle, diaphragm, moderator, and cover are not shown. Fig. 4 is a modification of fig. 1, where a different form of cover and different method of securing the diaphragm are represented. In this figure the valve, spindle, diaphragm, and weight are not given; *d* is a flange cast upon the top of the casing of the chamber, B′; *f f* are two flat rings or washers of India-rubber, gutta percha, or other suitable material, between which the diaphragm is inserted; a metal ring is then placed thereon, or a metal ring, together with the edges of the gutta percha moderator, and the whole secured by bolts and nuts, *g g*. K is the metal cover. The supply pipe may be screwed into either of the inlet apertures, A, and the other plugged up.

TONNAGE AND STEAM SHIP REGISTRATION.

It will be in the recollection of our readers, that at the Cheltenham meeting of the British Association, a committee was appointed "*to inquire into the defects of the present methods of measuring and registering the tonnage of shipping, as also of marine engine power, and to frame more perfect rules, in order that a correct and uniform principle may be adopted to estimate the actual carrying capabilities and working power of steam ships.*"

The committee consisted of Lord Hardwicke (Chairman), Messrs. Andrew Henderson, John Scott Russell, James Robert Napier, Charles Atherton, Arthur Anderson, Rev. Dr. Woolley, Messrs. W. Mann, G. F. Young, Captain J. O. Owen, Professor Bennett Woodcroft, and Mr. James Perry.

Messrs. Mann and G. F. Young, the eminent shipbuilder, declined to act,—the latter, we believe, on the express ground that he entirely disapproved of the objects for which the committee was appointed,—and their places were supplied by Admiral Moorsom and Mr. John McGregor.

The Report of the committee so constituted was presented to the mechanical section of the British Association at Dublin, on the 28th August. It is not our intention to publish this Report *in extenso*. It will be sufficient to state that, after very mature deliberation, the members of the committee could not agree on the most important points submitted to their inquiry. They unanimously agreed, however, to two propositions, viz.—1. "That in making a deduction for propelling machinery and fuel, the deduction for tonnage based on space, as by the present law, should be rated on *actual space occupied*." 2. "*That the registration of marine engines should, in addition to the nominal horse-power, embrace the number and diameter of the cylinders, and length of stroke, or other indication of the size of engine, according to its construction, as well as the number and size of the boilers, and total area of the fire-grates.*" The Report terminates with the following pregnant paragraph: "The committee supposed it important to confine the Report to those points on which *a definite and almost unanimous opinion could be given.* With respect to the question relating to the registration of weight, tonnage, and displacement, after maturely considering the evidence, the committee *did not agree in such a manner* as to be able to recommend this portion of the subject for legislative amendment."

We congratulate the committee and the British Association on this common sense and rational view of the question here adopted. Appended to the Report are the recorded opinions of members of the committee and others with regard to the main questions at issue, given in reply to certain queries which were published in our Number 1737, for the 22nd Nov., 1856.

Putting aside for the present purpose the replies of gentlemen not members of the committee, it appears that six members of the committee recorded their opinions, viz., Mr. John Scott Russell, Rev. Dr. Woolley, Mr. J. R. Napier, Mr. Charles Atherton, Mr. Andrew Henderson, and Admiral Moorsom; the three former against, and the three latter (Admiral Moorsom, however, in a very modified degree,) in favour of determining by law a definite load water line, and adopting displacement as the basis of tonnage registration. It was the opinion of the opponents that there exists no recognized rule of science by which a definite load water line can be assigned, and that for the British Association, in the name and interests of science, to recommend for legislative enactment a rule (such as that proposed by Mr. Atherton), based on the purest empiricism, would be detrimental to the interests of science, and unworthy of a body professedly scientific.

The advocates of a legalized load water line, on the contrary, adopt a rule proposed by Mr. Atherton, which, as we have already said, is confessedly of a purely empirical nature, for determining the freeboard, that is, the distance between the deck and the load water line. The rule is, add together $\frac{1}{20}$th of the length, $\frac{1}{4}$th of the beam, and $\frac{1}{4}$th of the depth, and divide the sum by 3, the result gives the freeboard. It is not pretended that this rule is founded on any scientific principle, but merely that it agrees pretty well with the allowance *actually* made in practice.

Of the kind of argument made use of by these gentlemen, the following, taken from Mr. Atherton's paper, affords a fair sample. After defining what he means by "freeboard," viz., the distance below the actual sinking limit and the load water line, he proceeds thus:—"In the first place, we may observe, that if the beam and draught of a ship be given, the freeboard will be somewhat dependent on the length of the ship, so that when a ship is crossing a wave and on the crest of it, not supported by the extreme forward and aft bodies, she may not be overwhelmed amidships, the total displacement being always constant. Hence the length of the ship requires to be noticed as an element in determining the freeboard. Secondly, if the length and draught be given, then the freeboard will be somewhat dependent on the beam or breadth of the ship; because ships in lying on the

side of a wave in an angular direction, or sailing on a side wind, are subject to roll or lie over. In fact, ease of rolling constitutes one of the desirable properties of a loaded ship, and it is found from experience that an angular roll, of certainly not less than 24°, must necessarily be provided for, and *this would give the freeboard amidships alone one-fifth of the beam;* consequently the beam requires to be noticed as an element in determining the freeboard. Thirdly, if the length and beam be given, the freeboard will be somewhat dependent on the draught, because the deeper a ship is, *cæteris paribus*, the less easily will she rise to the sea, and therefore the more liable to be broke over at the bows or pooped at the stern, unless these tendencies be met by increased surplus buoyancy or freeboard in proportion to depth. Consequently, the depth of a ship also requires to be noticed as an element in determining the freeboard."

After this delightfully conclusive train of argument, Mr. Atherton submits "that an investigation into the existing practice as to the ratio which ordinarily exists between the freeboard and the length, breadth, and depth of the hull will be the best means of deducing a rule for determining the distance in question." He immediately, however, proposes the rule we have already cited, which he evidently considers as answering the requirements of the case.

It is not our intention to waste our readers' time in exposing the fallacies in this precious piece of reasoning. One thing, however, must strike our readers at once in this "exposition," and that is, that all ships of the same *length*, *breadth*, and *depth* are herein treated as alike, whatever may be the forms of the midship section of the bow and of the stern! The Chinese principle is to be introduced: rising floors and flat floors, fine run and entrance, bluff bows and full run, are all the same on this theory. This may, indeed, be called "Naval Architecture made Easy." It may, we think, be fairly taken for granted that, if the safety of the ship for the extreme angle of rolling of 24° be provided for, the other two requirements here set forth may be considered as sufficiently satisfied. And if, as Mr. Atherton states, one-fifth of the beam answers to an angle of rolling of 24°, then the freeboard ought, according to his argument, to be in all cases one-fifth of the beam, neither more nor less. This would not, however, serve his purpose.

Of the absurdity of the rule actually proposed, nothing could be a better proof than the examples he gives. Of course, one-twentieth of the length must be taken to represent the freeboard due to length alone, one-fifth of the beam that due to breadth, and one-fifth of the depth that due to depth. Now, it appears that if a ship be 300 feet long, 30 feet broad, and 20 feet deep, the freeboard due to length alone is 15 feet, that due to breadth is 6 feet, and that due to depth 4 feet. What can be imagined more preposterous than such a ratio as this gives us? No wonder that such a style of reasoning should lead to the result that a steam ship 400 feet long, 40 feet broad, and 20 feet deep would have no available space for cargo at all!

If we *assume*, in the true Athertonian method, the several ratios of length, breadth, and depth (even supposing that any simple ratios for different kinds of vessels will answer) which may suit us, it would be no difficult matter to show that almost any vessel could be too deeply loaded at her light draught for any useful purpose. We should not have thought it worth while to point out these absurdities, but for a subsequent use which Mr. Atherton has made of this precious rule, which we shall hereafter have to mention.

The logic of Mr. Atherton's principal supporter, Mr. A. Henderson, may be judged of from the following extract from his very long-winded "evidence:"—"With respect to the question of fixing a limit of loading or load draught line, it does not appear to me so difficult as one might be led to suppose; at present we can obtain from the builder his construction load-line and the launching draught, and if, in addition, we obtain the draught of water, the scale of displacement, area of midship section, and the other particulars, as shown in the builders' or surveyors' certificate (proposed by Mr. Henderson), we have sufficient data for assigning a proper limit of loading, as intended by the builder, *who ought to be the best judge of what the capabilities of his ship are.*" Dear, kind, confiding man! Leave to the parties most interested the task of assigning their own load water line!

This, however, seems to be too absurd an idea to be absolutely embraced by our kind-hearted friend; so he improves on his proposition as follows: "Should the builder assign a load draught and displacement, such as nautical science may not justify, the safety limit which depends much on the proportion and *form* of the vessel, and the freeboard or height of gunwale, or medium height of *upper deck* above the load line, may be estimated as suggested by Mr. Atherton," whose rule, we have seen, takes no account whatever of the *form* of the vessels—only of the principal dimensions, and has no reference whatever to the gunwale or medium height of the upper deck. In other words, he adopts Mr. Atherton's rule, at

the same time giving to it an interpretation which Mr. Atherton does not give, thus offering a signal proof of its value.

With regard to Admiral Moorsom, who on February 23 wrote a paper favouring the view taken by Mr. Atherton, after weighing the "evidence," he materially modified his opinion in his letter of March 24, on which day he writes: "I concur in the opinion that science has nothing to gain by legislation, except the repeal of laws which impede her progress; and believing that the interference of authority in things which can be matter of bargain between man and man, must always be pernicious, I would tolerate such interference only where no other security can be had against misdoing." It is, however, but justice to say, that he "adheres to his opinion that for each vessel there should be a draught of water beyond which she should not be loaded, but instead of a penalty, would merely withhold the clearance."

It would have been imagined by ordinary persons that a judgment deliberately given by a majority of the committee—and we think we may add a majority, comprising those best qualified to deal with the question—would have been satisfactory; that the minority would have acquiesced, so far, at least, as the action of the British Association is concerned. No such thing. Mr. Atherton is no ordinary person; he is not to be deterred by ordinary difficulties; he is too well satisfied of the soundness of his own views to be bound by a majority; he will still press his notions on the British Association—directly if he can; if not, by a *side-wind*. He accordingly offered for reading concurrently at the mechanical and statistical sections of the British Association the paper which we inserted in No. 1778 of our Magazine. The reading of that paper at the mechanical section was very properly opposed, as being a virtual reopening of the questions settled by the "Report of the Tonnage Committee" just received. Notice, we understand, was also conveyed to the committee of the statistical section of this opposition. Notwithstanding, the paper was read, and what is more, a committee recommended to be appointed by the British Association for the purpose of conducting the inquiry recommended by Mr. Atherton. We look through the list of the committee of the statistical section for the names of persons conversant with naval architecture, but, with the exception of Mr. J. R. Napier—who would not certainly have taken part in such a recommendation—in vain. It is true that we see the names of two others who have associated themselves with Mr. Atherton, viz., Mr. James Perry and Mr. James Yates—the former of whom, we presume, qualified himself for taking part in the conduct of the proposed inquiry by being a sleeping member of the Tonnage Committee, while the latter was appointed, by Lord Hardwicke, secretary of that committee, and threw himself at once into Mr. Atherton's arms.

Now we should like much to know how the statistical section was induced to move in a matter not only not at all concerning it, but in direct opposition to the mechanical section which was concerned, and thus to virtually reopen a question closed by the solemn adoption of a report of a committee appointed at a former meeting. The only solution of this enigma that we can arrive at is, that one or two members of the committee of section F proposed the recommendation of a committee, and no opposition being raised—as how should there be?—the rest of the committee, being profoundly ignorant about the matter, and therefore indifferent, acquiesced. And of whom was the committee obtained by this notable means to be composed? Of course of competent and impartial persons, selected with the greatest care, in order to hide the backstairs influence by which the appointment had been procured. Let our readers judge. The committee was to consist of Messrs. Atherton, Henderson, Perry, and Wright! Of the two former our readers know enough already. Mr. Perry, as we have already said, qualified himself for this inquiry by having taken no part whatever in the former. Of Mr. Henry Wright, all we know is that he is a very young man, of whose special qualification to conduct this inquiry we have never heard, but who acted as assistant secretary to the tonnage committee, and in that capacity deserved well of the disposers of such patronage for giving "evidence" (unknown to the great majority of the committee until they saw it printed in the report), in favour of Mr. Atherton's views. And this was the committee, as originally proposed, to make the "Statistical Enquiry" demanded by Mr. Atherton—or rather, as was evidently designed, to register his decrees with a view of giving them ultimately the stamp of the British Association! It seems, however, that to this committee were afterwards added the names of Admiral Moorsom, Messrs. McConnell, J. Scott Russell, and W. Fairbairn. Messrs. McConnell and Fairbairn justly rank high as mechanical engineers, but we are not aware of their special qualifications to conduct an inquiry which, to be of any use, requires on the part of its conductors a thorough knowledge of the principles of naval architecture. They would doubtless be most valuable members of such a committee, in conjunction with a

sufficient number of gentlemen acquainted with naval architecture. Admiral Moorsom and Mr. J. Scott Russell are the only members of the committee possessing any professional or special acquaintance with the subject. On looking at its composition, one is but too forcibly reminded of Prince Henry's remark on Falstaff's tavern bill: "Oh, monstrous! But one halfpennyworth of bread to this immoderate deal of sack."

There is one reflection with regard to the British Association itself which strikes us forcibly on reviewing this whole matter. It appears that Mr. Atherton's paper read at the Cheltenham meeting, in consequence of which the tonnage committee was appointed, was printed among the reports officially made to the Association, thereby stamping it with an authority to which none but the most valuable scientific papers are entitled. And yet, of the scientific value of this paper none could possibly at the time have been competent judges; and it is notorious that, from the statements and recommendations therein contained, most, if not all, competent authorities who have given attention to this question have utterly dissented! How is it that the constitution of the British Association permits such very questionable proceedings? How is it, too, that at this moment two of the sections, one of which is competent to deal with the question proposed, and the other is not, are at open variance, and that the latter has carried the day? Verily, one would imagine that the title of British Association for the *Advancement* of Science is a misnomer, and that the name of the British Association for the *Confusion* of Science would be more apt. It is manifest that sufficient care and caution are not exercised with regard to the character of the papers and propositions to which this learned body vouchsafes its imprimatur.

If the cause of this is to be found in an inherent fault of the constitution of the body itself, as, for instance, that the whole proceedings taking place in the limited period of one week, does not allow time for the submission of such papers to the consideration of properly qualified persons to report on their merits—or any other such circumstance—the result must inevitably be to discredit, in the eyes of the world, all their recommendations. If the cause is to be found in something over which control can be exercised, the sooner the path of reform is entered on the better for the credit and prospects of the Association.

And now, with regard to the paper itself, which has been considered so important by the statistical section as to induce it to put itself into a position of hostility towards the mechanical section. We have said that the object of it, among other things, is to reopen the question closed by the report of the tonnage committee; viz., the expediency of adopting a definite load water line and external measurement as the basis of tonnage registration. A single sentence will suffice to establish this case; viz., where Mr. Atherton recommends "that the definition and measurement of tonnage shall be in accordance with the existing law, viz., the 'Merchant Shipping Act of 1854,' *subject to such amendments thereof and additions thereto as may be found necessary to render the act complete for all the purposes of shipping registration.*" What those additions and amendments are, our readers must pretty well know by this time. Those who feel inclined to give themselves the trouble, will find, on reference to the paper inserted in No. 1778, that the whole of the remainder of it, after the sentence we have quoted, is devoted to an "exposition" of the insufficiency of the present system of shipping registration as a record of the capability of ships.

We shall now offer a very few remarks on the value of the "statistics" of Mr. Atherton, on which he builds so wonderful a superstructure. First, then, we observe that these *tables*, which are presumed to prove so much, are a mere figment of Mr. Atherton's teeming brain. We need not remark that an important item among the "elements of construction" in these tables is the freeboard. We have already seen the train of argument (?) on which a certain rule for calculated freeboard, viz.,

$$F = \frac{1}{3}\left\{\frac{L}{20}+\frac{B}{5}+\frac{D}{5}\right\}$$

(where F is freeboard, and L, B, and D are the length, breadth, and depth) was gravely proposed by Mr. Atherton for the adoption of the tonnage committee to be recommended to Government for legislation; and, as we have seen, accepted by some of the members of that committee. This was no longer ago than the end of May. The value which the author himself attributed to that precious rule is demonstrated by his adopting, in August, an entirely different rule, in which one element, the depth, is entirely left out of the consideration! He now calculates the freeboard as equal to

$$\left\{\frac{L}{40}+\frac{B}{12}\right\}.$$

Let us first see how this measure accords with the former one.

Taking the vessel, length 300, breadth 30, and depth 20, the freeboard as first proposed was 8 feet 4 inches. According to the new

rule it would be $\frac{300}{40}+\frac{30}{12}=10$ feet; and the imaginary ship which was to have no available space for cargo, whose freeboard according to the first rule would be 10 feet 8 inches, will, according to the new rule, have a freeboard of $\frac{400}{40}+\frac{40}{12}=13$ feet 4 inches!! The vessel in this latter case is assumed to be deeply leaden at a draught of 6 feet 8 inches! Is not this perfectly monstrous?

We have seen that one of Mr. Atherton's chief allies—Mr. Henderson—adopts the former rule, only allowing freeboard from the *gunwale or medium height of upper deck.* There is some glimmering of common sense in this amendment. But does Mr. Atherton adopt it? While he proposes a rule which we see so materially adds to the freeboard, does he measure it from the gunwale or upper deck? By no means. He measures it from the medium height of the lower deck; for the constructor's dimension depth is, according to him, the sum of load draught and freeboard. Thus his ship (X) is evidently intended to be the nearest approximation he can get to the *Great Eastern;* at all events, the depth accords nearly enough with her depth, viz., 51 feet from the lower deck to the keel; and Mr. Atherton gravely assumes, that of this 51 feet of depth in hold, the ratio of the immersed to the unimmersed part should be as 30 : 21 or 10 : 7!

We have further to remark that, according to these tables, the results for the various imaginary ships (for they are all imaginary), can have no relation whatever to the truth, unless they are built on one single type, taken, doubtless, to suit the "exposition;" for in all the load displacement is taken at $\frac{6}{10}$ L. B. D.; freeboard buoyancy at $\frac{7}{10}$ L. B. F. The external measurement is taken as the sum of these. The light displacement is to be always one-third of the external measurement; and the index X, taken from the formula

$$\frac{V^3\ D^2}{\text{Ind. H. P.}}=X,$$

assumed for all at 250!

It is unnecessary to waste more time in exposing the monstrous fallacies of this precious paper, which has so turned the heads of the Statistical Section of the British Association. Adopting such principles as Mr. Atherton does, viz., such as always best suit the "exposition" he wants to make, it would be no difficult matter to prove anything whatever. And yet, upon the strength of such calculations, Mr. Atherton sneers at the builders and designers of the *Great Eastern.* The great Mr. Atherton—who, at first, in his deep humility, deprecates any authority for his opinions with regard to the assignment of a statute-gauge mark, but now, waxing bolder, assigns a rule for freeboard, which he treats as a scientifically-demonstrated fact—presumes to teach such men as Mr. Brunel and Mr. Scott Russell the elements of their profession, and to apply to the British Association for a committee to act ultimately upon Parliament to require these tyros in their art to keep in the right path!!

We have no desire to follow Mr. Atherton farther in his "Chinese" mode of treating the science of naval architecture and marine transport. We have said enough, and more than enough, to show our readers the value of the "exposition" contained in the paper which we published in No. 1778, and which has produced the remarkable results to which we have called attention.

We would, in conclusion, emphatically warn the British Association of the folly of permitting itself to be led away by Mr. Atherton's sophistries, and in opposition to the deliberate report of a committee appointed by itself a year ago, and to that section of its own body to whose province this question properly belongs, of lending itself to the development of a crotchet which will bring it into direct collision with all who are interested in the true progress of naval architecture, and with the Government also, if, perchance, they are induced to make it any recommendations, and which will certainly issue in no credit whatever to itself.

ON IMPROVEMENTS IN ORDNANCE.

BY CAPTAIN BLAKELY, R.A.*

A 16-inch shot would present but sixteen times the surface to the action of the air (to retard it or make its flight inaccurate) as a 4-inch shot, but would weigh sixty-four times as much, and would therefore be retarded and blown out of its course but $\frac{16}{64}$, or $\frac{1}{4}$ as much. A gun four times as accurate as a nine-pounder, and with the immense range due to the less resistance of the air, would be a powerful weapon on board fast steamers. A few 30-inch shell guns would be useful in war, and really conducive to peace, if placed on the banks of the Thames, the Clyde, or the Mersey. If any foreign power were to quarrel with us, and suddenly appear with thirty or forty gun boats armed with one monster gun each, he

* British Association, 1857.

could destroy Portsmouth. None who know Mr. Armstrong's application of hydraulic power will doubt its adaptability to move guns of any size, and with little human labour.

Large guns require more strength than small ones, as the powder occupying in each the same proportional space, the small shot moves in say $\frac{1}{500}$th a second a certain number of inches, the large shot in the same time moving fewer inches; so that at the end of that time the gas in the small gun would have much more proportional room to expand in, and would therefore press less on the gun than in the larger one. Added to this, the large shot would require more time to get its velocity, and the pressure must remain on the gun so much longer.

May not the TIME a material can bear a tension be an element worthy of experiment? A piece of India-rubber requires a pressure even ten times greater than will ultimately break it to be applied during a certain time, and if, before that time has expired, the pressure be removed, the India rubber is not broken. May it not be so with cast steel, for instance—that it has the power of bearing an immense strain for a long period, but beyond that strain it cannot bear much even for $\frac{1}{100}$th second; and may not cast iron bear a pressure during $\frac{1}{500}$th second, which, if continued during half a second would destroy it? I believe the sudden and short strain caused by the explosion of gunpowder to be less, not more injurious, as is generally thought, than an equal strain applied gradually, but left longer. However, a 32-pounder is the limit of cast iron guns of the present shape; any larger than that being unsafe with full charges. (See Sir Howard Douglas on "Naval Gunnery.") Adding thickness to the metal would give little additional strength. Professor Barlow calculates that a cylinder 1 inch thick and 1 inch in internal diameter, when strained, stretches only $\frac{1}{9}$th as much in proportion outside as inside, the cross section remaining equal, so that the interior diameter being stretched to $1 + \frac{1}{1000}$th, the exterior, instead of becoming $3 + \frac{3}{1000}$ths (as it would if the outside layer *put out* an equal strength to the inner, according to the law "*ut tensio sic vis*") becomes only

$$3 + \tfrac{1}{9} \text{ of } \tfrac{3}{1000}, \text{ or } 3 + \tfrac{1}{3000}.$$

The cross section being

$$(3 + \tfrac{1}{3000})^2 = 9 + \tfrac{1}{500}$$
$$-(1 + \tfrac{1}{1000})^2 = 1 + \tfrac{1}{500}$$

the difference = 8 round inches being the same as when not strained, or $(3^2 - 1^2)$.

If, with the present thickness, the outside does but $\frac{1}{9}$ its duty, we can expect but little additional strength from adding to it, Professor Barlow, arguing that the strength *decreases* as the *squares* of the distances from the centre. The same law puts a limit to the size of brass or cast-steel guns, or of wrought iron if in one welded mass.

Mr. Dundas, of Dundas, in 1855, made a beautiful gun of staves of wrought iron hooped; but, though the workmanship was exquisite, water got through with a pressure of 3 tons. Of course, the gas of powder would also have penetrated, and separated the staves.

I would suggest for guns up to ten inches a shape very like the present, but the outside at the breech strengthened with two layers of thin wrought iron cylinders, put on very hot and hammered. One I made so stood 605 rounds, all with double charge, and the last 158 *rounds loaded to the muzzle.* This is evidently greater strength than is required for anything under 10-inch guns. Above that, I think, with a cast-iron cylindrical centre, that either rod iron wound round at a great heat, and welded layer over layer, but each, in cooling, taking a permanent strain, or else iron wire wound round it, each layer having a greater initial strain than the one under it, would be the best way. We thus get all the fibre in one direction, and much of the material equally strained when the gun is fired, the outer portion thus using nearly its entire strength, not as in cast-iron guns, but *one-ninth part* of it.

Mr. Armstrong, of Newcastle, made a gun of a solid steel centre, with bar iron coiled round it and welded. This gun has stood some thousands of rounds. Mr. Brunel thinks so highly of wire, that he was getting a gun made when he heard of a patent for it, and desisted. I discovered, early in 1855, that Mr. J. Longridge, C.E., agreed very nearly with me in opinion, having arrived quite independently at his conclusions; and since then we have been working together. I exhibit some cylinders which he experimented on; the strain cannot have been under *56 tons per inch* on some of these, reckoning brass and wire, *or at least 70 tons an inch on the wire*, as there the strength lay.

This would make very serviceable field 8-inch howitzers. Such howitzers need not weigh over 8 cwt.

If we do not possess the most efficacious weapons possible, we shall find ourselves overpowered some day, as any foreign power could secretly prepare a flotilla of gunboats, and manufacture the large guns, to destroy our fleets and seaports.

WRIGHT'S SELF-ACTING WATER-CLOSET APPARATUS.

Mr. W. Wright, of Holly-street, Sheffield, has obtained a patent for the simple and efficient self-acting apparatus for water-closets represented in the annexed engravings.

Fig. 1 is an high-pressure flushing apparatus.—A is an air-tight metal box or pipe,

Fig. 1.

with a stuffing box on; C is a spindle with a tongue on it, covered with India-rubber on both sides so as to cover up the inlet pipe, B, and when open, cover up the outlet pipe, K. The above illustration shows the closet at rest, and the bottom of the inlet pipe covered up by the tongue turned up by the weight, L. When the lever, I, is acted on by a pressure from the seat, the lever, H, is then raised up, and the spindle, C, is turned down on the mouth of the pipe, K, and the water runs in and compresses the air in the box, A. When the pressure is removed from the seat, the spindle is then returned back to its place and stops the water from coming into the box, and lets out the contents, the compressed air in the box sending out the water into the basin with the same force as if it came in a larger pipe from the place direct.

Fig. 2 is the low pressure, in the same movement, except that the water runs into the pipe, E, and fills the box to make the water fall down to flush the basin. F is the cistern which supplies it with water. B is the pipe coming down to the small box, D. C is an air-pipe put above the water level in the cistern.

"A great advantage in the construction of these closets is," says the inventor, "the entire absence of any complicated machinery, and consequently they are less liable to be put out of order or broken by acci-

Fig. 2.

dent or carelessness. Any bulky substance which, by the negligence of the occupiers of the house, may be thrown into the basin, will not pass over the bend in the pipe, but may be extricated by the hand without removing the woodwork, or causing the least injury to the apparatus. The above apparatus dispenses with taps, cranks, and wires, and has no points for leakage, as the body of the tongue always stops the water from coming into the box. The simple water-closet has many advantages; being

free from all machinery, and imperishable in its material, it cannot get out of repair; it displaces no impure air; it is noiseless in action; saves the expensive lead trap; flushes the basin with a small quantity of water, and may be fixed in any situation."

THE IRON TRADE.

(*From our Correspondent in Wolverhampton.*)

Continued Prosperity—Board of Trade Returns—Export of Machinery—Evidences of Prosperity—Activity of Works—Increase of Malleable over Pig Iron—Large Consumption of Red Ore—The Decision of Preliminary Meeting—Past and Future Prices of Malleable Iron—The Same of Pig Iron.

THE iron trade continues to maintain the prosperous position which we had to assign to it last month. Since that date the value of the exports has gone on increasing, more than proportionate with the returns issued from the Board of Trade just after our last monthly notice was written.

These returns showed that, with the exception of the minor description, wire, the value of the iron exported in July this year was an increase upon the corresponding month last year. The figures were—

	1856.	1857.
Pig iron	£100,213	£136,511
Bar, bolt, and rod ..	542,953	618,517
Wire..............	17,251	14,894
Cast..............	55,993	58,522
Wrought iron of all sorts............	327,372	330,796
	£1,045,782	£1,159,240

By the same return we found that the iron manufactured into machinery was of considerably more value in July, 1857, than in July, 1856. Whilst the value of the steam engines sent out in 1856 was £70,796, that exported in July, 1857, was £98,614. The machinery of "other sorts" rose in the corresponding period from £186,084 to £299,527.

The prosperity of the trade in the past month is shown in several particulars. Conspicuous amongst these, is the fact that, with the exceptions incidental to the sultriness of the weather, short time has not been made at any of the leading works. Then it is notorious in the trade that 5,000 tons per week of manufactured iron is made in excess of the quantity of pig iron produced. In South Staffordshire, the difference is reported to be supplied by other producing districts. The quantity of pig iron smelted weekly in South Staffordshire is about 15,000 tons, while the weight of manufactured iron produced by the mills and forges exceeds 20,000 tons per week.

An equally significant fact is this, that the consumption of red ore, which last year amounted to £440,000, and was then an increase upon the previous year of £110,000, is now so great that it is impossible for the few proprietors of this article to supply the existing demand. A further evidence of prosperity is found in the decision of the preliminary meeting of the trade on the 30th Sept., at Wolverhampton, respecting which, although the meeting had not been held when these notes were written, there was no doubt in the trade that the resolve would be to confirm the prices which have prevailed for some time past, and which are said to be 28s. above the level; at 26s, there would be an almost unlimited demand from the United States.

Prices generally of manufactured iron have been maintained in the past month. There have been a few cases in which very low rates have been accepted, but they have been accepted only by needy makers, and the description of iron supplied by them has corresponded with the prices which they have received. The month of October is not expected to be an alteration upon this state of things.

In pig iron prices were a shade easier just before the preliminary meeting than they were a month previous; but they are getting firmer at the time that we write, and in the next month prices are expected to be more favourable to smelters than they have been in the past four weeks. The increased demand of the malleable iron works in consequence of there being then no impediment in the temperature of the weather to the progress of the trade, is the ground of this expectation.

THE TRIAL OF CAPTAIN KYNASTON'S BOAT-LOWERING APPARATUS AT DEVONPORT DOCKYARD.

*To the Editors of the Mechanics' Magazine.**

GENTLEMEN,—One of the back numbers of your magazine, that of August 1st, has only just come under my notice, which contains a letter from a correspondent who signs himself "An Eye-witness," (a very blind one, as I am prepared to show) so full of misrepresentations, and of a nature so calculated to mislead yourselves and your readers on a subject which has of late occupied some considerable space in your columns, that I must claim the privilege of

* The following letter is of too personal a character to render its publication altogether agreeable to us; but its appearance really seems to be demanded in justice to Captain Kynaston. We have, however, felt bound to remove from the letter the direct designation of one of the principal officers of the dockyard at Devonport.—EDS. M. M.

another eye-witness, and crave your indulgence to find a place for the following comments. Considering the fact that the number of eye-witnesses of Captain Kynaston's late trial at Devonport of his apparatus for lowering boats was limited, in addition to the officers appointed as judges, to his own personal friends or members of his own profession, and to two of the civil officers of Her Majesty's Dockyard, Captain Kynaston can hardly be at a loss to trace so calumnious a misrepresentation to its original source.

Your correspondent correctly states, that, during the trial, Captain Kynaston and his brother officer—the latter well known as one of the first practical seamen in our navy, and one, moreover, ever ready, when work is to be done, or a friend to be served, and not likely, at all events, to be deterred by a prospect of a wet jacket—were, on the occasion alluded to, when it was blowing half a gale of wind, lowered from the *Zephyr*, two or three times while the vessel was at considerable speed; it is also perfectly true that once the boat shipped a certain quantity of water during the process of disconnecting, although the operation was completed. It must be borne in mind, however, that the two captains had nothing to do with *lowering themselves;* in fact, Captain Kynaston's plan differs essentially from that of Mr. Clifford on this head, inasmuch as the process of lowering is performed *inboard*, while that of *disconnecting* only is carried on in the boat. I may add, that the cause of the mishap was entirely owing to the neglect of the two dockyard riggers, whose place it was to attend the tackles inboard, and therefore did not arise from any defect in the plan.

However, your correspondent's eyesight seems to have suddenly failed him at this crisis, for he goes on to state that, a boat fitted on Clifford's principle, which, for some reason best known to himself, was suspended at the opposite side, was then lowered (he might have added, against the repeated orders of the senior naval officer present), and *went round to the assistance* of the captain.

Now, I beg leave to state, so far from rendering any assistance to the captain, that, owing to the vessel having comparatively *lost her way*, there was so much difficulty in dragging the pendants through the "friction-blocks," in spite of the strenuous exertions of Mr. Mills and his appointed crew, that Captain Kynaston and his friend were on their return to the ship before their would-be preservers could have possibly reached them, even had the latter ever *left the ship's side.*

I will now quote another passage, by the gross inaccuracy of which I must infer that your correspondent, who styles himself "An Eye-witness," is really subject to the natural infirmity, or else temporarily afflicted with that peculiar class of blindness which some persons find it convenient occasionally to assume. He goes on to state, laying some facetious emphasis, moreover, on the assertion, that, after the partial ducking above referred to, *neither Captain Kynaston or his friend went into the boat in any of the subsequent lowerings made under similar circumstances of speed.*

This statement, however unimportant in matter of fact, I have no hesitation in saying is downright falsehood; for, after the men *inboard* had been sufficiently trained under his own eyes, and the lowering of the boat successfully performed both at reduced speed and with the engines stopped (Capt. Kingcome being still in her), Capt. Kynaston then took his friend's place in the boat, and at his request, the vessel having been put to her *full speed*, was disconnected from the vessel in a manner which excited the marked approbation of the naval judges and the warm congratulations of his friends.

It is to be borne in mind that the case alluded to was the first time, either in public or private, that Captain Kynaston had ever made trial of his invention afloat; it is, moreover, well known to the dockyard authorities at the same place that one of Mr. Clifford's trials, made under their very eyes, proved a total failure, and was for a time suspended through an accident which had nearly proved serious; and yet it would have been an injustice, for the sake of one unforeseen event, to condemn a plan which has generally proved, on trial, to be so successful.

In fact, accidents will occur with the best of plans, especially when the men who have to carry out the details are not sufficiently trained; and I was, therefore, from the very first, more inclined to attribute Capt. Kynaston's simple mishap to a similar cause, than to give any weight to certain suspicions of foul play which were whispered about among a portion of the persons who witnessed it. At the same time, it seems to me quite possible that one of the "eye-witnesses," at all events, may have viewed with some degree of complacency the infliction of a gentle shower-bath on the two captains —an infliction he himself appears to have undergone to a considerable extent on a former occasion, while practically officiating for his friend Mr. Clifford at one of his lowering trials. It is also by no means unlikely, when he ordered Clifford's boat to be suspended to the trial vessel, that some golden opportunity of a puff of his pet invention may have foreshadowed itself in the

fertile imagination of the same functionary. Be it as it may, one thing is, however, certain, that during the trial the same party took an unworthy advantage of his presence as an amateur to instil every possible kind of prejudice into the minds of Capt. Kynaston's naval friends against the invention under trial: whether or no the designer himself was included, is immaterial.

As to the latter part of your correspondent's letter, I have but little to say; but this I will assert, that the report of Capt. Kynaston's invention to head quarters was favourable, and that there was never any intention on the part of the Board that that trial was to test the comparative merits of Capt. Kynaston's with any other plan whatever.

Nor did Capt. Kynaston, after he had offered his plan freely, ever attempt to press the matter on the Board. If Mr. Clifford had already established his just claims to the consideration of the Admiralty, they were at least bound to give him the precedence.

Capt. Kynaston's motives for not pushing are best known to himself; whether owing to his state of health or other matters, Mr. Clifford and his friends have no reason to complain of his present inaction, or if he should be pleased to follow an opposite course at any future time.

I am, Gentlemen, yours, &c.,

ARGUS.

September 20, 1857.

MR. DRAKE'S IMPROVEMENTS IN CANNON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN, — Having carefully compared Mr. Drake's invention with several which you have lately published in your valuable Magazine, particularly with that in No. 1772, July 25, 1857, I am pleased with the superiority of the English over the American plan, in compactness and simplicity, and I am at a loss to account for Lord Panmure's selection. I agree with you, that Mr. Drake's conduct is "noble;" and with him, that British ministers should be at liberty to appropriate inventions for the good of the State, from any and every quarter. It is, indeed, "a very serious thing for a gentleman to be allowed to spend fifty years" in designing, for the national benefit, without acknowledgment or remuneration, and clearly there must be something "rotten in the State of Denmark,"—red tapism, favouritism, or some other ism, unless the desirability of the plans was the mere phantom of a hard-worked brain. Now, the latter cannot be altogether the case with Mr. Drake, as his plan, even if "not his best," gives evidence of inventive power of no inferior order; and it would be hard if, out of 400 modifications alluded to, there could not be found something worthy of serious attention. The mechanical *simplicity* and the pleasing outline of the plan struck me at once; yet I must observe, I do not yield it my unqualified approval, and I am sure, from the liberal tone of Mr. Drake's *brochure*, he will pardon my saying I could suggest some improvement. Perhaps if it is "not his best," he has not given it mature consideration. However, I have seen and read sufficient to convince me that we need not import from across the Atlantic what we can provide better at home; and in the present time of difficulty it behoves our English ministers at least to inquire into the results of a practical man's fifty years' study for the benefit of the State. There are other fields open, and Russia is ever ready and anxious to grasp at improvement.

I am, Gentlemen, yours, &c.,

G. W. JACKSON, C.E.

Plymouth, Sept. 19, 1857.

IMPROVEMENT IN STEERING VESSELS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I think that I am correct in saying that for every change made in the direction of a vessel by the rudder, an equal change should take place in the position of the sails, although I am quite aware that this does not at present take place. It must be so, because a constant wind cannot act the same on a sail when in two different positions; hence, in turning, its former position should be altered.

To effect this, I propose to connect the sails and rudder, which might be done by fixing the former to rods attached to hoops put round the masts. The rods should reach to the bottoms of the masts, where, instead of hoops should be fixed pulleys, on which should run a chain connected with that of the rudder. Thus a kind of frame would turn round the masts, to which the sails might be fastened. But as it is clear that this connection would under various circumstances require to be broken, I propose that a loose pulley should be fixed on every mast under the one connected with the frame, on which the chains could be slipped when the above should be necessary. The frame would now be loose, and consequently the sails under no control, but by placing pieces of wood of a necessary

length into holes prepared for this purpose, made in the pulley connected with the frame, they might be brought into any position, and the chain being re-slipped, the operation necessary would be completed.

I do not think that the strain on the rudder would be very greatly increased if an additional pulley were added for the chain to pass over; possibly, however, this might not be required.

I of course intend the chain to run along the deck and be covered in any suitable manner; and, hoping that I have made my idea sufficiently clear,

I am, Gentlemen, yours, &c.,

J. A. D.

THE SUBMERGING OF ELECTRIC TELEGRAPH CABLES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—You have already given me so much space in your pages for the discussion of the question of the laying of telegraph cables, that I should perhaps leave the letter of Mr. Benjamin Cheverton in your last number unanswered. However, I will venture to request your indulgence once more, as there are two classes of persons likely to be influenced by Mr. Benjamin Cheverton's letter; viz., those who take assertion for argument, and those who, after reading the first paragraph of Mr. Benjamin Cheverton's letter (accusing a person, who has not the honour of his acquaintance, of "mental hallucination," &c., for differing with him in opinion) will decide at once that he is in the wrong.

To proceed to his assertion. He says:—"A vessel depositing a cable whilst over a level platform of the ocean will lose none of it for any other reason than because the cable sinks faster than the vessel moves."

Let us imagine two vessels, with one end of a cable in each, starting off in opposite directions, at a rate of say three miles an hour each, and that the cable sinks at precisely the same rate. At the end of twenty minutes my impression is, that the distance between the vessels will be two miles, and that the least possible amount of cable paid out will be $2 \times \sqrt{2}$, or nearly three miles. This any person can understand, and I trust that most of your readers will see further, that to reduce the waste in this case to the difference between 1 and $\sqrt{2}$ a tension must have been applied from the ship equal to the weight of a piece of cable which would reach from the first immersed portion to the surface.

I quite agree with the latter part of Mr. Benjamin Cheverton's letter, and I doubt not many existing companies will be extremely obliged to him if he will tell them how to pay out a cable quickly and safely. If he had read my paper carefully, he would have seen that I stated that greater speed, if practicable, could overcome the difficulty, and that I say nothing about floats, the suggestion of which I must be permitted to repudiate.

I am, Gentlemen, yours, &c.,

J. A. Blakely.

Sept. 21, 1857.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In contrast with Mr. Cheverton's letter in your last Number, I think it would be well to publish the following extract from the *Athenæum*, Sept. 5, relating to the discussion which followed Captain Blakely's paper:—

"During the conversation which arose in the section after the reading of this communication, a new light seemed to break upon the members, as it seemed to be universally admitted that it was mathematically impossible, unless the speed of the vessel from which the cable was payed out could be almost infinitely increased, to lay out a cable in deep waters (say two miles or more) in such a way as not to require a length much greater than that of the actual distance, as from the inclined direction of the yet sinking part of the cable, the successive portions payed out must, when they reached the bottom, arrange themselves in wavy folds; since the actual length is greater than the entire horizontal distance. The fact, therefore, which, when noticed, led to the increasing of the strain on the Atlantic cable until it broke ought to have been anticipated, and must be provided for in the future progress of that great national undertaking."

I am, Gentlemen, yours, &c.,

A Reader.

Screw Propellers.—The Paris correspondent of the *Times* states, that a young French officer has invented a new screw propeller with which very extraordinary results are obtained—results which, we fear, no kind of propeller whatever could produce. The inventor is said to have had the form of the new propeller suggested to him by an attentive study of the motion of particles of water leaving one of the ordinary screw propellers.

HINDOO KNOWLEDGE OF IRON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In the year 1822, being on a visit to a near relative of mine, who was stationed with his Sepoys at the fort of Palghaut, in South India, an English widow woman, Mrs. Sayers, employed some forty natives in the cabinet trade, including various work in iron, brass, &c. She purchased quantities of the old iron shot, shells, and grenades from the authorities, and her native smiths converted them into the best wrought iron and steel. When I was stationed at Parsonstown, in the year 1825, Lord Oxmanton, now the Earl of Rosse, kindly did some work in iron and steel for me. As I wished to make some experiments with an ordnance hand-grenade, it was necessary to soften the hard cast iron, in order to drill a hole in it, and thinking that, as the aboriginal natives of India knew the necessary process of effecting it, I concluded that it must also be known to iron workers in England generally; but Earl Rosse, who had a good knowledge of such matters, after trying various plans to soften the grenade, was obliged to give it up. I believe the art of softening such cast iron is now well understood by that distinguished nobleman.

I am, Gentlemen, yours, &c.,

Rosherville, Sept. 21. J. NORTON.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

KUKLA, F. X. *Improvements in apparatus for heating stoves by gas.* Dated Jan. 10, 1857. (No. 90.)

A metal tube is employed, closed at the upper end by a mass of metal, and fixed at its lower end by straps to a bar, so as to admit atmospheric air into the tube at the bottom. The upper part of the tube below where it is closed is perforated. One end of a gas pipe having a regulating cock is passed through and fixed to the bar, so that the upper end rises some height into the tube. On the inside of the tube is a cylinder of wire gauze which descends below the parts of the tube which are perforated, and the lower part of which is closed in around the gas supply pipe by a cone of gauze. The gas is thus admitted into the cylinder of gauze and is there mixed with atmospheric air, and the two together pass through the perforations in the upper part of the tube, and are ignited. This apparatus is placed inside any suitable case, forming a gas stove.

OLLIFFE, C. R., and J. A. GOLLOP. *Improved apparatus for cleaning knives.* Dated Jan. 10, 1857. (No. 91.)

The improvement here (which relates to rotary knife-cleaners) consists in arranging the rubbing surfaces which act upon the blades in a cycloidal or a volute form upon the carrying discs (such rubbing surfaces being about 1 inch wide, more or less), in place of distributing the rubbing surface over the entire surface of the discs.

PORTER, J. F. *Improvements in the manufacture of bricks and other articles of clay and brick earth, or of the like materials.* Dated Jan. 10, 1857. (No. 92.)

This consists—1. In improvements in the preparation of clay for making bricks and other articles. These have reference to the pug mill described in the specification of a patent dated 31st Jan. 1855. 2. Of apparatus by which the material used for such articles is moulded as follows:—The clay is delivered to the machine through an opening, and is received by a series of rollers covered with a porous fabric, some of which are caused to revolve in order to roll out the clay, or to mould the same. The articles are then divided by cutting wires.

WATT, W. *Improvements in treating or preparing Indian corn and other grain, and amylaceous vegetable substances for fermentation and distillation.* Dated Jan. 10, 1857. (No. 94.)

The patentee takes Indian corn and steeps it in hot water. Or the grain is malted so as to convert a portion of it into diastase. He then grinds the grain with water. When the substance has not been previously malted it is mixed with a portion of the malt in the mash tun, or in the grinding process, so that there may be a portion of diastase present to convert the starch into sugar. The mash or sweet wort is then fermented or boiled with hops, and is then treated by the ordinary processes for distillatory or brewing purposes.

BROOMAN, R. A. *Improvements in galvanic batteries, and in apparatus connected therewith.* (A communication.) Dated Jan. 10, 1857. (No. 95.)

This consists—1. In the construction of galvanic batteries in which the elements are put into motion in the exciting fluids, or in which the exciting fluids themselves are put in motion, both for the purpose of facilitating the action of the fluids upon the elements. 2. In the application for the purpose of jets or currents of air to the fluids of galvanic batteries. 3. In a method of preserving the constancy of galvanic batteries by causing fresh supplies of the exciting fluid to flow continuously into the cells. 4. In combining with the above improvements the employment as an exciting fluid of acidulated water containing bichromate of potassa, or binoxide of manganese, or other similar substance. 5. In certain apparatus connected therewith.

WILSON, G. F. *Improvements in treating Burmese and such like petroleum, and their products.* Dated Jan. 12, 1857. (No. 98.)

This consists in the distillation of Burmese and such like petroleum and their products in a vacuum or partial vacuum.

GOODWIN, A. *An improvement in fixing the tubular flues of steam boilers.* Dated Jan. 12, 1857. (No. 99.)

The ends of each of the tubular flues are formed with male screw threads, and on the inside of the boiler a nut is screwed on a washer of sheet iron, and a washer of vulcanized India rubber. On the outside of the boiler a screw nut is placed; or other mode of fixing may be resorted to. By screwing up the nuts on their respective male screws, the tubular flues are fixed in the boilers.

ESKHOLME, G., and H. WILKES. *Improvements in apparatus for preventing waste of water from service pipes and cisterns.* Dated Jan. 12, 1857. (No. 102.)

This apparatus consists of a cylinder with a piston. On the lower end of the stem of the piston is a double-faced valve, the seat of which is between the faces. When either one or other of the two faces is on the valve seat a flow of water will pass into the closet. The movement of this valve is controlled in a peculiar manner described in the specification.

CHRIMES, R. *Improvements in apparatus for regulating the pressure of fluids.* Dated Jan. 12, 1857. (No. 103.)

According to one modification this apparatus consists of a valve stem fitted at each extremity with a piston, working in cylinders cast on the main, and this stem carries also a disc valve near its middle. The top or inlet piston is of smaller area than the bottom or outlet piston, and the area of the valve is smaller than either of the pistons. The fluid acting between the inlet piston and the valve raises that piston, and with it the valve, the piston being of larger area than the valve. Modifications of the invention are included.

BOWER, A. *Improvements in or applicable to the keels of navigable vessels.* Dated Jan. 13, 1857. (No. 104.)

The object here is to give to sailing vessels a greater hold of the water. The width of the lower portion of the base of the keel is increased for, say, about ¼ or ⅓ of the centre portion of its length, causing the oblique or angular sides to gradually diminish and die away towards the extremities into vertical parallel sides.

HINKS, J., and G. WELLS. *An improvement or improvements in metallic pens.* Dated June.13, 1857. (No. 105.)

This consists in constructing certain tongues on metallic pens, for supporting the pens, and preventing them from coming in contact with the article on which they are laid.

GOSSAGE, W. *Improvements in the manufacture of sulphuric acid, and in the construction of apparatus used for such manufacture.* Dated Jan. 13, 1857. (No. 107.)

This invention very closely resembles that of the same inventor, described at page 282 of our No. 1780, for Saturday last.

POTTER, M. *The application of certain materials in the manufacture of healds for weaving.* Dated Jan. 13, 1857. (No. 109.)

This consists in the application of the horny and other gelatinous parts of animals to the formation of those parts of healds for weaving through which the threads of the warp pass, and by the immediate action of which the shed is opened for the passage of the shuttle. The horns, &c., are cleansed and softened, submitted to the action of glycerine, reduced to the form of sheets or strips, cut and stamped, or moulded into the required form.

VERDEIL, F. A., and E. MICHEL. *Improvements in obtaining extracts from madder for dyeing and printing.* Dated Jan. 13, 1857. (No. 111.)

This consists in crushing the madder root, and extracting it with an alkaline liquid from which the colouring matter is afterwards precipitated by an acid. The crude colouring matter thus obtained is dissolved in alcohol or wood spirit, and the solution is distilled to again separate the alcohol or wood spirit; the pure colouring matter remains in the retort.

BARSHAM, J. *An improvement in the manufacture of mats or fabrics used for packing.* Dated Jan. 13, 1857. (No. 112.)

The mats or fabrics may be made of flags, rushes, straw, &c., and they are woven or tied together as heretofore, the improvement consisting in forming on such mats or fabrics raised parts to act as partitions between the articles packed or placed between such raised parts.

RUSSELL, R. *Improvements in stoves and fire-places.* Dated Jan. 13, 1857. (No. 113.)

This invention was described and illustrated at page 103 of No. 1773.

MURRAY, J., Sir. *Abating the smells and increasing the fertilizing usefulness of liquid manures, sewage, gas, or other liquors, and for means of raising or propelling such mixtures and other liquids or fluids to convenient heights or distances.* Dated Jan. 14, 1857. (No. 114.)

The patentee uses strong vats or condensing vessels, fortified by supports externally, so as to be capable of resisting a pressure of from one to five or six atmospheres. They are also lined air-tight.

The condensers are also furnished with strong pipes having suitable valves or cocks to admit gas, steam, or vapour for discharging sewage, &c. Some of the vessels are also fitted inside with fans or chains for agitating such liquid mixtures, and have also revolving or passing through them acids and carbonates to evolve streams of fixed air, so as to carbonate the liquids, abate offensive smells, fix volatile vapours, ammonia, and the like, and render the products better adapted for fertilizing lands and crops, and also to press on the fluids to impel them or other bodies. Other features are apparently included.

HADDAN, J. C. *Improvements in smelting ores, and in roasting and extracting products therefrom.* (A communication.) Dated Jan. 14, 1857. (No. 116.)

This consists—1. In producing the current of air necessary to the reduction of the ores in a furnace, by exhausting the air and gases as produced by a fan or otherwise. 2. In roasting or partially roasting ores by means of the heated air and gases thus collected, or otherwise passing off from furnaces; and also the application of the said heated air and gases to the smelting process. 3. In constructing furnaces, particularly those for smelting the ores of iron, with the interior passage or chamber of the furnace lying at an inclination, and with hoppers communicating therewith at different parts, so as to afford the means of making special additions to particular portions of the contents, and so as to assist in the reduction, or to give a different character to the metal, perforations being made for inspecting the progress, for tapping the furnace, and for ingress of air.

NEWTON, W. E. *An improved steam engine.* (A communication.) Dated Jan. 14, 1857. (No. 117.)

This consists of an oscillating piston arranged within a stationary box of a peculiar character, to which the steam is admitted, to exert its pressure on opposite sides of the piston alternately, and from which it is allowed to escape (after acting on the piston) by a properly operated valve or system of valves. The peculiar character of the box aforesaid is such that by interposing water between the steam and the piston, little fitting is rendered necessary between the piston and the box to prevent leakage of steam.

NEWTON, W. E. *An improvement in rollers employed in calendering, mangling, and other processes of analogous character.* (A communication.) Dated Jan. 14, 1857. (No. 118.)

This consists in manufacturing these rollers of the husks of maize or Indian corn.

HOBBS, A. C. *An improvement in locks and latches.* Dated Jan. 15, 1857. (No. 120.)

This consists in a peculiar form and arrangement of the follower and crank or player, operated by the spindle of the knob or handle to draw back the latch bolt. It cannot be described without engravings.

FOWLER, D. H. *An improvement in steam boilers.* Dated Jan. 15, 1857. (No. 121.)

This cannot be described without engravings.

PARKER, G., and W. MARTIN. *Certain improvements in machinery for opening, cleaning, and preparing cotton.* Dated Jan. 15, 1857. (No. 122.)

This consists in making the edges of the bars or rails of the grates or grids with V-shaped or other notches or grooves, the object and effect of which is to open and clean the cotton more effectually, and to reduce the amount of cotton wasted or carried away with the dirt that drops through the grids.

HIGHAM, J. *Improvements in valve musical instruments.* Dated Jan. 15, 1857. (No. 123.)

This consists in so constructing valve musical instruments that the valve notes shall be equal in tone to the open notes. The valves employed are rotary valves. These are placed in the instrument so that the passages for the air shall be in the same direction for the valve notes as for the open notes, consequently no impediment is offered to the current of air in passing through the instrument; whereas in valve instruments of the usual construction an indirect passage is unavoidable.

WATKINS, F. *Improvements in machinery for manufacturing bolts, spikes, and rivets.* Dated Jan. 15, 1857. (No. 126.)

This consists of a peculiar combination of mechanism for receiving and holding a rod or bar between clamping dies, at the back of which are placed blocks or springs of vulcanized India rubber, enclosed in suitable boxes or cases, so as to confine such blocks or springs, and yet allow of their offering some elasticity to the clamping dies, which is requisite to suit them for holding rods or bars of somewhat different sizes.

NEWTON, A. V. *An improvement in steam engines.* (A communication.) Dated Jan. 15, 1857. (No. 127.)

This relates to certain means of adjusting the wearing surfaces of the working joint between the cylinder of oscillating and rotary engines and the stationary induction and eduction passages, which communicate with the steam pipe and exhaust pipe.

HOMAN, J. *Improved machinery for folding cloth into lengths.* Dated Jan. 15, 1857. (No. 128.)

The object here is to fold up lengths of cloth by mechanical means so that it will be laid in uniform lengths of lap ready to be cut up into garments. The patentee provides a reel capable of expansion and contraction to receive and wind up the cloth, which reel, by contracting in proportion as the cloth accumulates upon it, will take up an equal amount of cloth at each revolution, and thereby arrange the cloth in folds of equal lengths.

BEDSON, G. *Improvements in coating and insulating wire.* Dated Jan. 15, 1857. (No. 129.)

The patentee melts pitch and a proper proportion of tar oil. To this preparation he adds caoutchouc, India rubber clippings, or gutta percha dissolved or softened in rectified tar, oil, crude naphtha, or other solvent, the whole being melted together with shellac or other resinous substance, so as to form a solid and elastic mass when cold. The whole being then stirred up is ready for use.

MUIR, M. A., and J. MCILWHAM. *Improvements in moulding or shaping metals.* Dated Jan. 15, 1857. (No. 130.)

These improvements are especially adapted for moulding railway chairs. The whole of the establishment in which they are to be carried into effect is specially arranged for the purpose in all its details, from the melting furnace or cupola to the discharge of the casting from the mould. We have not, of course, space to describe these details.

TOWNSEND, T. J. M. *Improvements in drain pipes, and in machinery for producing the same.* Dated Jan. 16, 1857. (No. 133.)

These consist in cutting ordinary drain pipes, formed by forcing clay through suitable dies in continuous length, into convenient lengths for use, in such manner that the ends of each piece of pipe shall be formed into corresponding indents or ledges, to interlock and mutually support each other.

HENSON, H. H. *Improvements in treating animal and vegetable fibre and fabrics, for preserving or waterproofing the same.* Dated Jan. 16, 1857. (No. 135.)

The invention consists—1. In impregnating such fabrics with some substance whose application shall result in filling up the capillary tubes or pores, or of coating the surfaces, or of filling up the interstices of the said fibres, to destroy all capillary action. 2. In covering one side of certain manufactured articles with a coating of some material impermeable to moisture, dust, and gaseous or volatile matters.

MOORE, G. S. *An improvement in combining steam engines and boilers, when used with screw or stern propellers of ships or vessels.* Dated Jan. 16, 1857. (No. 136.)

This consists in placing the engines below decks and the boilers on the decks, and in arranging suitable gearing to work the valves of the engines from the deck. A steam pipe descends from the boiler to the engines, and a return steam pipe is conveyed from the engines to the boiler furnaces or chimney. By these means the weight is to be better distributed, and valuable space below decks obtained.

BOUSFIELD, G. T. *Improvements in sewing machines.* (A communication.) Dated Jan. 16, 1857. (No. 137.)

This consists—1. In a rigid feed bar, without either vertical or lateral motion, and sliding back and forth in ways or guides in a horizontal plane. Also in a series of pins, through which the thread is laced, to give the required tension to correspond with the shuttle thread without affecting its twist. Also in constructing the needle bar for sewing machines in the form of a segment of a circle. Also in the construction of a slotted shuttle driver. Also in carrying the shuttle back and forth by means of a single pin, so that the thread may pass over both the point and heel of the shuttle without obstruction.

VASSEROT, C. F. *An improved paint.* (A communication.) Dated Jan. 17, 1857. (No. 139.)

This paint, called "iron oxyd bronze," is composed of pyrites or sulphides, mixed with vegetable and mineral varnishes.

VASSEROT, C. F. *Covering all descriptions of grain with a fertile substance or manure, and the apparatus employed for the same.* (A communication.) Dated Jan. 17, 1857. (No. 142.)

This consists in covering grain and other seeds (previously to being placed in arable land) with substances suitable to assist the growth of the gum, such as charcoal reduced to an impalpable powder, guano pulverised, &c.

REEVES, R. and J. *Improvements in machinery for delivering manure for agricultural purposes.* Dated Jan. 17, 1857. (No. 148.)

The manure is placed in a box mounted on a carriage. The box is formed with a curved bottom, with openings for the passage of the manure, and over each opening a slide. At the lower part of the box a rotating axis works, and on this axis there are inclined blades or portions of screws, each of such a width as to move the quantity of manure desired; and the peculiarity of the invention is, that the inclined blades, which are to bring up or move the quantity of manure to an opening, are inclined to the axis in opposite directions.

LONG, J. *Improvements in the fastenings of brooches and other articles of jewellery.* Dated Jan. 17, 1857. (No. 150.)

Instead of connecting the pin or fastening to the brooch by a hinge joint, the patentee connects it by a hooked spring catch attached by one end to a fork-shaped piece of metal, securely fixed to the back of the brooch, and disposed across or at right angles to the aforesaid pin when connected to the brooch. At another part of the back of the brooch, and opposite to the before mentioned forked piece, he affixes a solid ring catch. And he connects the pin to the brooch each time of wearing.

FORTUNE, N. *Improvements in the manufacture of knife handles.* Dated Jan. 19, 1857. (No. 151.)

This relates to the complete manufacture by mechanical means of knife handles. The several operations are effected separately by separate tools or apparatus.

SAGAR, T., and C. TURNER. *Certain improvements in power looms for weaving.* Dated Jan. 19, 1857. (No. 153.)

These consist—1. In a novel method of governing the swell of the shuttle-box, and consists in the application of a spiral or other spring in a nearly direct or positive line to the back finger of such swell. 2. In an improved form of the slay sword levers of the anti-positive motion, being improvements upon the invention for which letters patent were granted to Christopher Turner, the 12th Jan. 1855. 3. In fixing the "stop rod" in the slay sword levers at a point below their fulcra. 4. In a novel method of disengaging the driving strap, or transferring it from the fast to the loose pulley.

HASWELL, J. *Improvements in the construction of railway carriages, which improvements are also applicable to locomotive steam engines.* Dated Jan. 19, 1857. (No. 154.)

This has for its object chiefly to equally distribute the weight of the carriage or engine upon the axle boxes. It consists in the adaptation of a movable truck or frame under the front of the locomotive, or under the end of a wagon or carriage, which movable truck or frame radiates from the centre between the driving or coupled wheels and the wheels of the truck frame, and also in the connection of the front part of the engine or boiler with the truck frame.

MITCHEL, W. H. *Improvements in means for distributing and composing types.* Dated Jan. 19, 1857. (No. 155.)

This cannot be described without engravings.

CLARK, E. *Improvements in floating docks.* Dated Jan. 19, 1857. (No. 157.)

This consists in arranging a floating dock so that it may be sunk to receive the ship, and afterwards be floated by pumping the water from the space between the side of the ship and the interior side of the dock. By allowing the dock thus to rest on the bottom the patentee is enabled to dispense with the air vessels necessary when the dock is kept floating while receiving the ship as heretofore. He constructs a pontoon or vessel consisting of an iron shell bolted to transverse girders or frames, built up of sheet and angle iron, and also to longitudinal ribs which connect these transverse frames. This vessel has blocks bolted on its bottom on which it rests when sunk, and its sides are higher than the draught of the largest ship it is required to dock. When the floating dock is to receive a ship it is sunk on a bottom suitably levelled and where the depth of water is not so great as the height of the sides; a gate which closes at its end is now opened, and the ship is floated in; the gate then being closed and the ship suitably shored, the water is pumped out.

BIRD, J. *Improvements in the manufacture of articles suitable to be used as window heads and sills, lintels and other similar parts of buildings.* Dated Jan. 19, 1857. (No. 158.)

This consists in manufacturing articles to be used as window heads, sills, lintels, &c., from fire or other clay, in a dry or nearly dry state, by forcing it into a mould by a great pressure. The articles thus moulded are burned in a kiln, in which are three or more walls or supports, across which the articles to be burnt rest, being kept apart by separating bricks. At the front of the kiln is a screw which, as the articles shrink during the burning, is used to force forward a block long enough to rest on all the supports, so as to keep the articles constantly in contact with the separating bricks, and never leave them room enough to twist or get out of shape.

CLARK, E. *Improvements in machinery or apparatus for raising ships out of the water for the purpose of examination and repair.* Dated Jan. 19, 1857. (No. 159.)

This invention was described and illustrated at page 481 of No. 1763.

WALTON, F. *An improved plastic composition, and in the application of machinery for manufacturing the same.* Dated Jan. 20, 1857. (No. 160.)

This consists in an improved plastic composition made of lacs or other resins possessing similar properties combined with fibrous substances for imparting tenacity and strength, and if requisite with colouring matter to improve the appearance. Also, in the application of masticating machinery, and of a heated cylinder, furnished with a piston rod and screw for preparing the composition, and keeping it in proper condition for working. Also in the application of ornamental forms with the composition.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

ADAMS, J. A. A. *Minié or other rifle-sight, on a new and improved plan.* Dated Jan. 10, 1857. (No. 87.)

This invention consists—1. In the slide being moved from the extreme end of the leaf towards the joint, giving in its progress the required and various elevations. The object is to obviate the necessity of having high sides or steps to the body of the sight.

DESRUES, P. *Improvements in purifying gas.* Dated Jan. 10, 1857. (No. 93.)

The inventor purifies gas by hypochlorites generally, but in particular by that of lime (chloride of lime); "these bodies seize the sulphurous compounds (principally sulphuretted hydrogen) contained in gas without at all altering the colour of the gas, or detracting from its lighter power. By this means the gas loses its offensive odour."

BROOMAN, R. A. *Improvements in propelling ships, boats, and other vessels.* (A communication.) Dated Jan. 10, 1857. (No. 96.)

This consists in fitting to the bow or other part of a ship two submerged wheels, placed horizontally. The wheels are fitted within half drums, and are made to rotate by cranked arms worked by the piston rod of a steam engine or otherwise.

BIRAM, B. *Improvements in machines for washing coal and other minerals.* Dated Jan. 12, 1857. (No. 97.)

The coal is placed in boxes with bottoms of wire supported in a frame-work, and with a loose frame of iron bars fitting the inside, about 3 ins. from the bottom. These boxes are suspended by a frame upon cams or eccentrics, which are fixed upon a shaft at angles of 90° with each other, whereby two boxes which are ascending are balanced by two others descending. When the coal is sufficiently washed, the box containing it is raised and tilted by a hook hung on a frame attached to a rope having three or four turns round the shaft, the other end being held by a workman. The box is retained by a catch until the washed coal is removed (by being raked out at one side of the box) and a fresh supply put in; the box is then released, and the washing goes on as before.

HOWELL, J. B., and N. HARVEY. *Improvements in the manufacture of steam boilers.* Dated Jan. 12, 1857. (No. 100.)

The best charcoal wrought iron is used, and in place of rolling the same into sheets, &c., the wrought iron is cut up into small pieces, and melted in crucibles with carbon and fluxes, and the melted product is run into moulds to form ingots or slabs, which are then rolled into sheets, &c., and such sheets rivetted together and strengthened in the ordinary manner.

SCOTT, U., and F. HOLDWAY. *Improvements in the manufacture of metal type, and the arrangement of the same for various purposes.* Dated Jan. 12, 1857. (No. 101.)

1. These consist of making metal type with points projecting from the face of the type, so that when impressed on paper or other material without ink, they will perforate it with the shape of each type or letter; and when the type is used with ink the face of it will print, and the points will perforate at the same time. 2. They consist in making a drum or wheel combined with an ink roller or bush so as to ink the type round the wheel or drum, and the printing surface of the type forming the periphery of the wheel or drum, and rolling it over the paper it will print and perforate at the same time when ink is used.

CHEETHAM, D. *Improvements in apparatus applicable to steam and other boilers.* Dated Jan. 13, 1857. (No. 108.)

This consists, 1. In the application of a thermometer to boilers for ascertaining the temperature, and consequently the pressure of steam. 2. In a mode of indicating the height of water in boilers, by means of a float partially or wholly immersed in the water, from which a rod passes up into a suitable glass tube on the outside of the boiler.

GALTON, R. C. *An apparatus for giving alarm to the inmates of dwelling-houses in cases of burglary.* Dated Jan. 13, 1857. (No. 110.)

This apparatus is to be attached to doors, windows, &c. It will remain stationary until by some disturbance of a lever or levers, and a consequent movement of the axis of a crank, when the reaction of a spring will cause the crank to revolve, and in so doing to release a spring from a forked connection between itself and the cord or wire attached to the crank. The spring sets at liberty a train of wheel-work actuated by a spring, weight, or other suitable means, which gives motion to apparatus for producing a loud and startling noise.

BLITTKOWSKI, G. A. *Improvements in breech-loading fire-arms.* Dated Jan 14, 1857. (No. 119.)

This consists in a peculiar method of constructing and operating certain parts at the breech together with the lock, whereby greater security against accidental discharge, or perfect joint at the union of the breech-pin with the barrel, and great simplicity of parts are effected. The principal improvement consists in what the patentee calls a rotating oscillating breech-piece, into which the charges are put in loading.

WILLIAMS, C. W. *Improvements in fur-*

nace grates and fire-bars. Dated Jan. 15, 1857. (No. 124.)

The improved fire-bars are made with arms projecting from each side, and set at such distances that those of each bar may be placed between those of the adjoining bar. The bars have projections for jointing to a connecting rod by which their motion is obtained. The improvements in grates consist in arranging a set of the above bars at suitable distances, and in giving them a backward and forward movement by a connecting rod beneath, by which they are elevated and depressed.

HENLEY, T. F. *Improvements in the preparation and manufacture of certain beverages or liquors of the nature and character of home-made wines, and in the means of obtaining the same.* Dated Jan. 15, 1857. (No. 125.)

This consists in the employment of rice in the preparation of certain beverages or liquors of the nature of home-made wines, and in improved means and processes for obtaining such beverages.

ADAMSON, R., and R. HOLLAND. *Certain improvements in looms for weaving.* Dated Jan. 15, 1857. (No. 131.)

This consists—1. In causing the slay to work from the crank or driving shaft bearing on one or more surfaces supported from the framing. 2. In causing the picking motions to be worked separately, by means of toothed wheels placed in any two parts of the driving shaft, the smaller wheels driving the larger ones which are fixed to the framing. 3. Of an improved treading or heald motion. 4. In causing the back bearer or yarn carrier to work in two slides or bearings attached to the framing, forming a motion at the control of the yarn. 5. Of a friction lever or levers for pressing the yarn beam in place of weights, ropes, &c.

HAYCRAFT, S. *Improvements in anchors.* Dated Jan. 16, 1857. (No. 132.)

This consists—1. In making the flukes of anchors convex. 2. In the construction of the cutter arms of anchors. The inventor makes the arms much broader and thinner than usual, the front being brought to a thin or sharp edge and the back made strong. He also attaches a cutter in front of the arms of anchors at present in use. 3. Of an improved method of attaching shackles. 4. Of improved joint arms of anchors. 5. Of improvements in central stock anchors. 6. In the construction of four-armed anchors.

EDRIDGE, J. *Improvements in safety pins for dress and other similar purposes.* Dated Jan. 16, 1857. (No. 134.)

This cannot be described without engravings.

JOHNSON, J. H. *Improvements in scutching machines.* (A communication.) Dated Jan. 16, 1857. (No. 138.)

This relates to an improved mode of regulating the admission of air into scutching machines during the scutching, to facilitate the separation of foreign matters. It consists in the admission of air at two places separated from each other at the under side of the drum.

PICHON, P. A. T. *An improved process for accelerating tanning without the assistance of acids foreign to the bark.* Dated Jan. 17, 1857. (No. 140.)

This consists in obtaining at once from the bark of the oak all the tannin and the gallic acid which it contains. There is placed into an alembic, for every gallon of water, 1 lb. of pulverised bark, from which is obtained by distillation about 12·000ths of a gallon of gallic acid. The distillation being finished, the inventor takes the bark and the water, and lets them cool in a tub, the tannin being disengaged from the bark by the effect of the ebullition. He mixes with this decoction the liquid which has been distilled, and then puts into a soaking tub about 220 gallons of it so mixed for every forty or fifty calves' skins, or twelve or fifteen cow skins, or eight or ten hides. The calves' skins are soaked as usual, and the cow skins and hides lifted as in the ordinary process.

VASSEROT, C. F. *A new beverage.* (A communication.) Dated Jan. 17, 1857. (No. 141.)

This consists in preparing a beverage (called taff) of extract of juniper, berry-gentian, cashoo (the rough cashoo reduced to powder), molasses, and yeast. The ingredients are mixed with water, and fermented.

DENNISON, J., and H. HIRST. *Improvements in looms for weaving.* Dated Jan. 17, 1857. (No. 143.)

This applies principally to looms for weaving broad fabrics, and where it is desirable that the shuttles employed should have anti-friction wheels or pulleys, and relates to mechanism for detecting the absence of the weft and stopping the loom when this occurs. The mechanism employed for this purpose is the common "weft fork," and connected parts arranged in the ordinary manner with certain exceptions.

WALKER, P. *Improvements in apparatus employed in distilling, and in the manufacture of vinegar.* Dated Jan. 17, 1857. (No. 144.)

This consists in the application of high-pressure steam for causing a circulation in the liquid from the mash tun, which liquid is to be distilled or made into vinegar. The apparatus may consist of a side pipe placed

near the mash tun, and in communication therewith above and below. To the lower end of this pipe a steam pipe is connected by a tap. When the mash is ready the steam tap is opened to admit steam into the side pipe. The tap between the mash tun and the side pipe is then opened, and the liquid from the mash tun is forced up the side pipe and into the upper portion of the mash tun.

AUTRAN, A. L. *Certain improvements in the wicks of candles and lamps.* Dated Jan. 17, 1857. (No. 145.)

The inventor makes the wick of asbestos, and fixes it in a circular support, by which the wick is kept upright. The support is grooved inside to facilitate the absorption by the wick of the fluid matter, and is set on feet, slightly smaller than that of the candle. At the inside of the wick a hole is made, in which is placed a small glass tube. Through the tube are passed horse hair or other fibres, which, before making the candle, are attached to the two extremities of the mould exactly in the centre. The candle is then run in the usual manner.

COOKE, J. and W. *A new or improved rotatory machine, to be used as a steam engine, water-wheel, fire-engine, or pump.* Dated Jan. 17, 1857. (No. 146.)

This consists of a drum on a shaft; the said drum is contained in an iron ring, forming therewith a steam tight circular passage, in which are fixed pistons. Fixed cams on the sides of the steam chest or passage engage with the sliding pistons, and draw them towards the centre as they approach and pass the fixed pistons.

STEINMETZ, A. *The improvement of circular gas burners and their chimneys, to be called the Steinmetz burner and Steinmetz chimney.* Dated Jan. 17, 1857. (No. 147.)

This consists—1. Of two parts, the usual body, but the upper portion is movable, being ground so as to be gas tight. This contrivance will also enable the inventor to place, when required, within the burner a diaphragm adapted to reduce the pressure of gas, and secure the advantage of a regulator to a certain extent. 2. A glass or chimney is added to the circular burner to increase the intensify of its light.

WARNE, W. *Improvements in the manufacture of deckle straps.* Dated Jan. 17, 1857. (No. 149.)

This consists—1. In making the straps hollow or concave on both sides; that is, thicker at the edges than at the middle; and, 2. In the application to the sides of the strap of a projecting edge or rib, extending longitudinally all round the strap.

VANNOY, H. *Certain improvements in heating foot-stoves, beds, and applicable to various other similar purposes.* Dated Jan. 19, 1857. (No. 152.)

This consists in arrangements to apply the heat evolved by the moistening of quick lime for heating foot-stoves or foot-warmers, chafing or warming pans, chafing dishes, the heating of beds, &c.

SMITH, T. B. *An improvement in constructing boxes for journals and other bearings.* Dated Jan. 19, 1857. (No. 156.)

This consists in the use of a composition, the principal ingredient and base of which is sulphur. Sulphur is used for the purpose of combining other materials with itself, which will allow the journals, &c., to run with less friction, and under certain conditions make the bearings self-lubricating. The materials found most conducive to this end are plumbago, stealite, or soap stone, cinnabar, or sulphuret of mercury, coal tar, mercury, and naphtha, mixed together in a liquid state.

EDWARDS, T., and D. ROWLEY. *New or improved machinery for rolling taper bars.* Dated Jan. 19, 1857. (No. 161.)

This consists of a pair of cylindrical rolls, the upper one of which is made to approach to and recede from the lower one, thus: the upper roll is pressed upwards by springs, and made to bear against cams or eccentrics acting upon the axes of the rolls.

BROOMAN R. A. *Improvements in the manufacture of petticoats and other knitted fabrics on circular looms or frames.* (A communication.) Dated Jan. 20, 1857. (No. 165.)

This consists in forming on circular looms, or frames, petticoats, and other knitted fabrics with plain hollow stripes or recessed parts, tucks, or puckers into which strips of whalebone, cane, steel or india rubber, or other flexible substance are inserted.

PROVISIONAL PROTECTIONS.

Dated May 22, 1857.

1444. Edmund Whitaker, of Rochdale, engineer, Alfred Law, of Littleborough, woollen manufacturer, and James Fletcher, of Little Clegg, near Littleborough, flannel manufacturer. Improvements in steam engines.

Dated July 28, 1857.

2060. Pierre Alexis Francisse Bobœuf, of Paris, chemist. Improvements in preserving and otherwise treating animal and vegetable substances, and in the purification of oils employed therein, and which may be used for other purposes.

Dated August 6, 1857.

2121. Sebastien Botturi, of Paris. A system of weaving for the manufacture of all kinds of textile goods, viz., shawls, silk stuffs, carpets, knotted or unknotted, single or double faced, gobelins, tapestry, drapery, velvets, damasked linen, and various other articles, by means of a frame which replaces the Jacquard loom.

Dated August 13, 1857.

2158. William Smith Wheatcroft, engineer, and James Newton Smith, agent, of Manchester. Improvements in valves and the chambers connected therewith, applicable to hydrants and taps for the supply of water and other fluids.

Dated August 15, 1857.

2170. Samuel Clift, of Manchester, manufacturing chemist. Improvements in the purification of certain gases, and in the application of their products to the manufacture of alum.

2173. Auguste Joseph Aucher, of Paris, gentleman. Improvements in elastic tissues for ladies' petticoats and other similar articles.

Dated August 18, 1857.

2194. Thomas Keddy, of Handsworth, Stafford, factor. New or improved machinery for the cultivation of land.

Dated August 19, 1857.

2203. Edward Lund, of Manchester, gentleman. Improvements in cocks, valves, pumps, and water plugs.

2205. William Hartley, of Bury, Lancaster, engineer. Improvements in steam engines and steam boiler apparatus.

2207. Franz Ruff, of Gray's-inn-road, mechanist, and Maximillian Gutkind, of Noble-street, commission agent. Machinery or apparatus for folding and measuring fabrics and registering the same.

Dated August 22, 1857.

2228. Henry Dircks, of Moorgate-street. An improved fire-escape. A communication.

Dated August 25, 1857.

2242. Francis Preston, of Manchester, machinist. Certain improvements in apparatus to be applied to the spindles of machines for preparing, spinning, and doubling cotton, and other fibrous materials.

Dated August 27, 1857.

2266. John McIsaac, of Manchester, joiner. A machine or apparatus for washing or churning.

2268. Charles and James Thompson, of Padiham, Lancaster, engineers. Improvements in apparatus for discharging condensed water, air, or other fluids, from steam pipes, drying cylinders, and other apparatus where steam is used.

2272. François Xavier Gentil, and Eugène Gentil, of Paris, chemists. Improvements in preparing and treating asphodel in order to obtain alcohol.

Dated August 28, 1857.

2274. John Brady, of Calais, esquire. Improvements in saddles.

Dated August 29, 1857.

2278. George Cumming, of Edinburgh, gentleman. Improvements in apparatus for thermometric, hygrometric, and barometric purposes.

2280. Jules Alphonse Chartier, of Paris, civil engineer. Certain improvements in steam engines.

Dated August 31, 1857.

2282. Peter Spence, of Pendleton, manufacturing chemist. Improvements in the manufacture of sulphuric acid, and in obtaining salts of ammonia thereby.

2284. William Clark, of Chancery-lane. Improvements in the application of portable rails or ways to vehicles. A communication from A. J. Florin, of Orleans.

2286. George Hallen Cottam and Henry Richard Cottam, of the St. Pancras Iron Works, Old St. Pancras-road. Improvements in the manufacture of children's cots and metallic bedsteads.

Dated September 1, 1857.

2289. Henry Coates, of Crawshaw Booth, Rawtenstall, Lancaster, mechanic. Improvements in heating liquids used in bleaching, dyeing, soaping, clearing, and sizing.

2291. George Bell, of South Inch-Michael, Perth, farmer. Improvements in reaping and mowing machines.

2293. George William Lenox, of Billiter-square, City, iron cable manufacturer. Improvements in apparatus for sounding alarums at sea.

2297. Eugene Grenet, jun., and Alexis Vavin, of Paris, gentlemen. An improved electro-magnetic machine.

Dated September 2, 1857.

2299. Evan Leigh, of Manchester, mechanical engineer. Improvements in constructing certain parts of machinery or apparatus used in preparing and spinning cotton and other fibrous substances.

2301. Thomas Welcome Roys, of Southampton, New York, master mariner. Improved apparatus applicable to the capture of whales and other purposes.

2303. James Petrie, of Rochdale, engineer. Improvements in apparatus for regulating the admission of air to furnaces.

Dated September 3, 1857.

2305. Thomas Holland, brass founder, and John Rubery, umbrella manufacturer, both of Birmingham. Certain improvements in the mode of manufacturing the runners and top notches of umbrellas and parasols.

2307. Joseph Richard Atha, of Heckmondwike, York, and William Pearson, and William Spurr, of Birstal, engineers. Improvements in railway signals.

2309. Harry Inskip, of Hertford, seed crusher. Improvements in fire-arms.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," September* 22, 1857.)

1289. C. W. Ramié. Improvements in the mode of attaching knobs to spindles.

1308. G. Heppell. Improvements in ventilating mines and such like places.

1314. A. P. How. Improvements in circular brushes for sweeping boiler and other tubes.

1315. J. Pym. Improvements in machinery to be employed on the water for raising and lowering weights.

1318. J. J. Myers. A new method of regulating paper laid on to be printed on one or both sides at and by cylinder printing machines by means of guides, whereby the present waste of paper in progress of printing is avoided.

1326. S. Hallett. Improvements in pianofortes. A communication.

1335. J. D. Malcolm. Improvements in the construction of buffing apparatus for railway engines and carriages.

1338. J. C. Dubois. Improvements in castors.

1341. W. E. Newton. Improvements in furnaces especially adapted to the generation of steam for motive power, but applicable to furnaces for other purposes. A communication.

1344. T. Briggs and J. Starkey. Improvements in machines for washing, wringing, and mangling.

1346. W. W. Bonney. A chemical composition or agent to be employed in lieu of, or to be substituted for, argol, tartar, and tartaric acid. A communication.

1347. E. Eley. Improvements in the manufacture and application of pipes for heating purposes.

1348. H. Tolkien and J. Middleton. Improvements in pianofortes.
1352. N. Ager. Improvements in connecting spindles of locks and latches with their knobs and handles.
1353. J. Peak. Improvements in the manufacture of gas.
1367. D. Reading. A new or improved spring for carriages or other vehicles.
1368. J. Carr. Improvements in machinery for hackling flax, hemp, and other fibrous substances.
1369. C. Bartholomew and J. Heptinstall. Improvements in machinery for rolling tyres and hoops for railway and other wheels, and also other articles made of iron and steel.
1370. J. Aislewood. Improvements in hat and umbrella stands.
1372. W. H. King. Improvements in kilns and stoves.
1374. R. P. Walker. Improvements in machinery for hulling and scouring coffee, and similar substances.
1383. F. Parker. An improved tell-tale for public vehicles.
1386. H. Jones. An improvement or improvements in engines for raising beer and other liquids.
1387. H. Trappes. An improvement in the construction of a sliding drawer applicable to all steam engines, either fixed or locomotive, for the distribution of steam, aeriform, or liquids used either as a motive power, or for any industrial or artistic purpose. A communication.
1388. G. H. Creswell. Improvements in apparatus for supplying ink or other mixture for stamps used in stamping letters and other articles.
1432. W. Owen. Improvements in machinery or apparatus for stretching woven fabrics.
1442. B. Samuelson. Improvements in safety apparatus for giving artificial light.
1450. S. Fox. An improvement in the manufacture of flat steel wire used for the manufacture of the ribs and stretchers of umbrellas and parasols.
1456. E. Travis and J. L. Casartelli. An improved apparatus for regulating the supply and discharge of steam, air, water, and other fluids.
1476. J. Earnshaw, jun. Improvements in the toothed coverings of rag machine cylinders, and in the machinery or apparatus for preparing the same.
1491. W. I. Ellis. Certain improvements in steam engines.
1501. J. Williamson, F. Williamson, J. Wright, and J. Wadsworth. Improvements in looms.
1508. E. P. Griffiths. Improvements in apparatus for beating the whites of eggs and other fluids and matters.
1548. R. Wright. Improvements in steam boilers.
1599. A. J. V. Dopter. Improvements in ornamenting cloth, wood, metal, leather, and other surfaces.
1633. A. V. Newton. Improvements in reaping machines. A communication.
1795. J. Bourne. An improved steam train for navigating shallow rivers.
1798. W. Crook, G. Rushton, and J. Crowther. Improvements in looms.
1814. N. Laurent. Improvements in the process of dressing and manufacturing shammy leather.
1820. H. Gilbee. Improvements in machinery for moulding vermicelli and other paste. A communication.
1880. F. Bousfield. Improvements in the manufacture of soap.
1902. N. M. Cummins. Improved means for indicating the proximity of icebergs. A communication.
1918. W. E. Newton. An improved construction of portable railway for steam traction engines on common roads or lands. A communication.
2045. B. Richardson. An improvement in the manufacture of articles in glass, so as to produce peculiar ornamental effects.
2092. C. Avril. Improvements in the mode of forming the printing surface of blocks, plates, cylinders, lithographic stones, or other similar bodies made use of for printing in colours.
2139. J. Bertram and J. L. Jullion. Improvements in the manufacture of paper.
2183. R. Hoe. Improvements in bullion boxes, and in boxes used for carrying other valuable commodities.
2208. J. M. Napier. Improvements in apparatus for paying out submarine telegraph cables.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2013. Nathan Thompson, jun.
2021. John Cunningham.
2041. William Hodson.
2048. George Collier and Samuel Thornton.
2071. The Hon. James Sinclair, Lord Berriedale.
2102. Arthur Boyle.
2126. Thomas Cooper.

LIST OF SEALED PATENTS.

Sealed September 18, 1857.

787. George William Sayer.
790. William Seaton.
791. William Moxon, John Clayton, and Samuel Fearnley.
793. William Banks and John Banks.
814. John Smith.
816. Jean Joseph Baranowski.
817. Frederick John Jones.
877. William Childs, jun.
1099. Henry Daniel Drane.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Dates of Registration.	Nos. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
Sept. 1	4017	F. R. Appleby	Derby	Conical oscillating valve.
,,	4018	J. R. Dicksee	Fitzroy-square	Feeding bottles.
2	4019	G. Chambers and Co.	Cheapside	Stereoscopic case.
8	4020	R. Bromwich	Birmingham	Lever and lever-plate for counter pumps.
19	4021	Derwent Foundry Co.	Derby	Grate back.

PROVISIONAL REGISTRATIONS.

Aug. 31	922	J. G. Reynolds	City-road	Syphon-pipe tube.
,,	923	A. Lazarus	Whitechapel	Coat.
Sept. 1	924	R. Broadbent	Dublin	Cutting off the ends of cartridges.
4	925	F. Wicksteed	St. Martin's-lane	Carriage spring.
,,	926	S. O'Brien	Dublin	Regulator for gas cocks.
10	927	T. Fisher	City-road	Window tightener.
15	928	T. Patstone	Birmingham	Hall lamp.
22	929	A. Gardner	Regent's-park	Elastic petticoat.

NOTICES TO CORRESPONDENTS.

J. A. D.—The properties of numbers mentioned by you are well-known to mathematicians in a more general form.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

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No. 1782.] SATURDAY, OCTOBER 3, 1857. [PRICE 3D.

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DR. BAIN'S YACHT "JULIA."

Mechanics' Magazine.

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DR. BAIN'S YACHT "JULIA."

The most remarkable yacht which has appeared since the arrival of the far-famed America in this country, is a little iron vessel, of only seven tons, called the Julia, *belonging to Dr. W. P. Bain, of Blackwall, who has the merit of having designed her* upon an entirely *novel and most successful plan.*

Most of our readers know perfectly well that, notwithstanding their ambition to attain *great speed with their yachts, our countrymen have an enduring regard to convenience and accommodation in their construction, and carefully study the promotion of what is called their "creature comfort," without which yachting would very soon fall into desuetude among many of them. It was the attainment of this* convenience and accommodation *that Dr. Bain (who is an amateur ship-builder, but apparently a very sensible one) had in view in designing the* Julia. *This little gem* is represented in the annexed engravings, *which we have obtained for the purpose of aiding* our description of her. Fig. 1 is a body

Fig. 1.

plan on the same scale as fig. 2; ... sheer plan on a reduced scale; fig. 3 is a half-breadth ... as is usual with ship-builders, on her sails set, showing her rig, &c. and fig. 4 (on the preceding page) is a view of her with ing Magazine." For this last figure we are indebted to "Hunt's Yacht- be removed, they will see the yacht as she was first built. If our readers will imagine the thin deep keel shown in figs. 1 and 2 to retained a considerable breadth quite down to the bottom of her keel. It will be observed that she formed hollow, and received the ballast, which was thus placed in the best possible position. This keel was down so low, affords an excellent cabin space—so excellent a space, indeed, that although tion. Upon the ballast the floor of the cabin is laid, and this floor being thus brought the yacht's dimensions are only, length (at water-line) 26 feet; breadth (ditto), 7 feet 11 inches; and draught of water aft 4 feet 8 inches, forward 3 feet; yet she has a cabin no less than 7 feet broad and 6 feet high, giving ample room for walking about, dressing, &c.,

not only without sacrificing speed, but in conjunction with great excellence in that respect.

THE ATLANTIC TELEGRAPH CABLE.

We have lately been favoured with a copy of an American newspaper, the *New York Herald*, dated Sept. 2, containing a very elaborate and interesting account, by an American writer, of the recent attempt to lay an electric cable from England to America. From this account, we extract the following information. It appears that the first accident connected with the actual laying of the cable, occurred on the morning of the 6th August: "In paying out, the cable," says the *Herald*, "slipped off the wheel, through the want of proper caution on the part of one of the men who had charge of it at this point, was caught between the wheel and the journal, and became wedged so tight that it was impossible to extricate it in time," and it consequently broke in the water. With some trouble and delay it was underrun from the shore, and eventually the two ends were spliced. "It is proper to state," says the writer, "that the paying out of the shore cable, which is an inch and a half in diameter, and weighs about seven tons to the mile, was a rather difficult operation, and attended by considerable risk." After the splicing had been effected, the *Niagara* again proceeded on the morning of the 7th. For the first five or ten minutes, the machinery did not run as well as could be wished, and "a thumping sound that excited the most unpleasant sensation was made by its (the cable) passing over the wheels." But the ear soon became accustomed to this, and so long as it passed safely into the water every one was satisfied. "The coil from which it was paid out was in the forepart of the ship, within a few feet of the forecastle, and as the distance from that to the stern was nearly her whole length, a number of men were stationed at intervals, like sentinels, between the two points, to see that every foot of it reached its destination in safety. Everything that could be done was done to give it a safe and speedy passage, but it

still continued to thump away at the machinery, and before the last part of it left the ship it created such an excitement on board, that all we had previously gone through in that line seemed trifling in comparison. The part where the shore cable is joined to the deep sea line gave way as it was passing over one of the wheels, and in a minute more the broken portion would have been out over the stern, and lost beyond all hope of recovery, at least in time to permit of the seasonable prosecution of the work this year. This was the most critical moment of the enterprise thus far; and had it not been for the wise foresight and precaution of Captain Hudson, there is no doubt that the splicing of that shore cable could never have been effected then. The provision which he made for such an emergency saved it, and the admirable management of the ship, by which all strain was taken off it during the process of splicing, is worthy of all praise. The captain had ordered a strong hawser, of sufficient length, to be placed near the stern of the vessel, where it could be used at any moment, and then awaited with no small degree of anxiety the time when it should be announced that they were ready to pay out that portion where the two cables were joined. At last it was reached, and the speed of the vessel having been reduced to a fraction of a mile, so that she could only be said to be moving through the water, it was passed through the hands of the men as carefully as if it were the most tender fabric in the world, and had just gone over one of the wheels when it was observed giving way at the joint. The captain was at once on the alert, and in a moment had it firmly secured to the hawser. Mr. Everett, the chief engineer of the ship, was at his post by the speaking tube, which extends from the poop to the engine room, and gave the order to stop or work the engine when it became apparent that there was any strain upon the cable. It seemed as if it would never be finished, although the joiners went at it with a will, knowing how much depended on their expedition, and performed it in half the time that would be given to it under other circumstances. The hemp serving and gutta percha insulation were cut off, leaving both ends of the copper wire or conductor perfectly bare. This was done in almost less time than it takes to relate the circumstance. The two conductors were then laid together, bound up with a single wire, and the whole soldered together. After this the gutta percha was placed over the conductor in a perfectly plastic state, and the insulation having been thus effected, the hempen strands were sewed upon it, the iron protecting wire or external armour placed over that again, and the whole securely bound with strong hemp. Having been spliced in this way, it was lowered down cautiously over the stern by the same hawser, so that there was little or no strain brought upon it, and in less than half an hour more the ship was on her course, going at a rate of from two to three miles an hour."

After giving a minute description of what passed on the 7th and 8th, and the ease with which the cable was payed out, we find our contemporary writing on Aug. 9, as follows: "All were of the opinion that the laying of a cable across the Atlantic was not only feasible, but that it would be accomplished in this present month of August, and by the ships *Niagara* and *Agamemnon*. There were some, it is true, who thought that there might be a difficulty when we came to the great depths, and that the increased weight and strain which would then be brought upon the cable, with the pitching and rolling of the ship in a heavy sea, might be more than it could bear; but after all, there was little danger to be apprehended from this, if the brakes were not put on, for it was observed that when they were employed for the purpose of checking its speed, they very frequently stopped the wheels from turning, and brought upon it the strain produced by the speed of the vessel—a strain which would part the strongest cable ever made, as it parted the shore cable but a few days ago, and only a short time after we got out of Doulus Bay. Those brakes, in fact, are the only things that we have to dread, and if they were once overboard there is no difficulty, so far as our experience has yet proved, in the way of the successful accomplishment of this enterprise. Before night we were going at the rate of five miles an hour, the highest we had reached yet. The rest of the squadron were somewhat astonished, and having graduated their speed by what they supposed we were going, from what we had done, they began to fall astern very rapidly for two or three hours. They soon found out the cause, however, and putting on a little more steam, took their former position. The ease with which the cable was paid out at this rate convinced all of the practicability of continuing it with perfect success, and with such favourable weather as had attended the enterprise up to this time, of laying the cable inside of sixteen days. All that was necessary was to look out for the splices, to reduce the speed at the proper time, and especially to avoid the use of the brakes except when imperatively necessary. The accumulation of tar in the grooves or sheaves it was feared might have a tendency to throw the cable off the wheels, but as it

was brushed away again by the cable almost as quick as it gathered, little attention was paid to it."

On the 10th he says:—"There was a great deal of excitement created by the cable getting off the wheels twice this evening, but fortunately it was put on again without any other accident. It was, to a considerable extent, a repetition of the same scene that took place when the cable broke off the coast of Ireland. The ship was backed immediately, the cable released from the strain, and in five minutes, which seems so many hours, it was put on the wheels again. When the order was given to the engineer to 'go ahead slow,' it is impossible to describe the scene which followed—the relief from a feeling of terrible suspense and painful excitement to which every one was wound up, to the warm and hearty congratulations that were interchanged, and the eagerness with which we still continued to watch the wheels, fearful of a repetition of the accident. The engineers kept near the machine, ready in case of emergency to go over the work again; but fortunately there was no call for their services in the same way this night, after the second catastrophe. The throwing of the cable off the wheels was caused by the accumulation of tar in the sheaves, which are not so deep and so wide as experience has proved they should have been. The tar, which is pressed out of the iron or protecting wire as the cable passes over the wheels, sticks in the sheaves until it gathers in some parts in large lumps, which become hardened by exposure to the air. The effect of this is to throw the cable off altogether, as occurred in the two cases just mentioned.

"We had hardly recovered from the alarm created by these accidents, when the whole ship was thrown into another state of excitement by the report that the continuity was gone—that the cable refused any longer to transmit the electric current; in a word, that all communication between the ship and the shore had ceased, in consequence of some accident to the copper wire or conductor, of which no one knew the cause. For two hours and a half the continuity was lost; and believing that all was over, that the 300 and odd miles which had been laid were laid in vain, that we would be obliged to return and report our own failure, when the eyes of the whole world were turned upon us, and at a time, too, when we confidently hoped that success was within our reach, if we only exercised a due amount of vigilance and caution, the engineers, Capt. Hudson, and Professor Morse had all agreed that the only thing to be done was to cut the cable for the purpose of getting it off the paying out machine, and transferring it to that which was to be used for winding up, and in regard to the successful operation, of which there were very serious and well-founded doubts.

"Mr. D. Sauty, the assistant electrician, and Mr. Bright consulted with Professor Morse as to the best course to be pursued, when he expressed the opinion that the strain to which the cable had been subjected at the time it slipped off the wheels had opened the gutta percha, and thus destroyed the insulation. This certainly seemed the only reasonable explanation that could be given of the affair, and the cause stated was generally accepted as the true one. About two miles of the cable had been paid out since that accident occurred, and the only question that now remained to be decided was, whether the winding machine could be safely employed in underrunning this length. This, as Professor Morse said, was for the chief engineer, Mr. Bright, to determine, and it rested with him to give the order to have the cable cut, in case he should so decide. Mr. Bright did so decide, and preparations were being made to carry his order into execution, when Mr. De Sauty informed Professor Morse that the continuity had been restored, and that the insulation had not been destroyed. In five minutes more the intelligence would have come too late, for in that time the cable would have been cut and the conductor thus detached from the telegraph instrument could not have given any indication of its being perfect up to the terminus on the vessel. The glad news was soon circulated throughout the vessel, and all felt as if they had been imbued with a new life."

On the 11th he says:—"This has been a sad day. We had retired full of hope, not, it is true, unmixed with a sort of dread that there was something still worse than what had yet happened impending over the enterprise. This morning, about four o'clock, we were awakened out of our sleep to hear the cable had parted in over 2,000 fathoms water. Five minutes after it had been announced every one was out of his bed to ascertain for himself if it was indeed true. There was, however, no reason to doubt, for there hung the broken end over the stern, swinging loosely, and there were the wheels as motionless as a rock. The other end had not yet sunk to the bottom, it had to descend more than two miles before it reached the plateau, and it would require more time to accomplish that. The noise that sounded like pleasant music in our ears had ceased, and the machine which had caused us so much anxiety had now become as so much useless lumber, blocking up the quarter deck. The cause of the calamity was the application of the brakes, at a time when it was almost fatal to use them. There was a

pretty heavy swell on, and, as usual under such circumstances, the stern of the vessel was elevated or depressed as she rose on each wave. It was while her stern was down that the brakes were put on, so that in addition to the strain produced by its rising again, the cable had to bear an additional strain of 3,000 pounds, as marked upon the indicator. This was more than it could bear, and the consequence was that it parted, as has been stated. The moment the brakes were used the wheels stopped, and when the stern rose again they remained immovable, so that, between the strain brought upon the cable by the vessel and that caused by the application of the brakes, it had, as I have said, to bear more than it was ever calculated to sustain. The indicator showed a strain of 3,000 pounds; but it is impossible to calculate the strain by which it was broken. Had the brake not been applied there is no doubt whatever that the cable would have remained perfect to the end, unless we were compelled by very great stress of weather to cut it. The circumstance, to say the least of it, was most unfortunate; but if the enterprise has failed, the expedition has proved one thing beyond all possibility of doubt, the practicability of laying a submarine telegraph cable across the Atlantic between Ireland and Newfoundland. Of this every man on board is as fully convinced as he is of his own existence, whether it be laid next year, or its accomplishment be postponed for fifty years to come."

We should not omit to record the following observation of the writer: "The iron wires," he says on the 8th, "which form the outer covering or protection, may become so corroded with the action of the salt water as to afford it no longer any protection; but while the insulation remains intact, the essential part of the cable requires no other protection than that given it by the gutta percha." This reflection is a very just one, and lends weight to the proposals that have been made to dispense altogether with the external wires.

BRAZILIAN RAILWAYS. — Mr. W. G. Ginty, C.E., manager of the gas works at Rio de Janeiro, has published a letter upon the most economical and suitable mode of ascending the *serras* or mountains which abound in Brazil. It seems that proposals have been made to lay down railways on which locomotive engines are proposed to be the means of drawing the trains up the inclines. Mr. Ginty argues that locomotive engines are not so suitable as the system of stationary engines for steep inclined planes practised in Great Britain and the United States.

THE WAVE LINE SYSTEM OF SHIP BUILDING.*

BY THOMAS MOY.

THERE are many practical men who have but a vague idea of the Wave Line System, and are ignorant of any reason why it is to be preferred; and the late Mr. Marett, of Southampton, in his clever work on Yacht Building, says of the Wave Line System: "I have consulted books, and attended lectures by the eminent originator of the system, but all attempts to obtain sufficient information to enable me to construct on the Wave principle have been most unsuccessful;" and again he says: "This system is founded on no theory whatever, and merely amounts to an artificial plan for obtaining tolerably good water lines, and until it has been demonstrated that they are the best that can be designed, any constructor should be unwilling to fetter himself by adopting so arbitrary a system."

A vessel afloat divides a column of water into two parts, one on each side of the keel. If we can discover the best movement for *one atom* of one of these portions at a right angle to the motion of the vessel (from A to B in the diagram) commencing at the stem and ending at the greatest breadth, it will be sufficient for the present purpose,—that of obtaining the best form of entrance lines.

As I have a dislike to the term *resistance*, I will herein substitute the word *duty* instead.

The bows of most vessels at the load water line are formed with an angle, the more acute the angle the more the vessel is praised as being a clipper; but there should be no angle here, any angle at the stem being as detrimental to speed as the same angle would be in any other part of the entrance line, and it is as absurd to have an angle at the stem as it would be to attempt to shunt a railway locomotive from one line to another with the junction laid down at an angle instead of a curve.

The crank, in machinery, imparts to a reciprocating body connected therewith the most perfect motion that can be obtained where a reciprocating motion is required. This motion may be traced throughout creation from the motion of the planets to the smallest pendulum: every circular motion may be resolved into a reciprocating motion, and the pendulum vibrates as though controlled by a crank. This motion is also the best for water, because water is subject to the same laws as those of solid bodies in receiving and imparting motion. The best motion, therefore, for the atom of

* British Association, 1857.

water from A to B (see figs.) is that which it would receive if connected with a crank in motion, the supposed crank arm being equal to one fourth of the vessel's beam, and the connecting rod being infinite. The curve necessary to produce this motion is called the wave line, and the load water lines of the vessels, Nos. 2, 3, 4 and 5, in the plan, are formed upon this curve in its integrity. Any attempt to hasten the motion of the atom of water by making any part of this line fuller than it is, will produce a decrease of speed.

Having found the best motion to be imparted to this atom of water, I will now describe the duty to be performed by the 5 vessels shown in the engraving, and proceed to show how an increase of speed may be obtained to an almost indefinite extent.

The whole of the vessels are represented as 40 feet beam. The bows of No. 2 being 100 feet long; No. 3, 200; No. 4, 250. Suppose No. 2 of 100 feet bow to come in contact with an atom of water at its stem while going 10 miles an hour: it pushes this atom aside 20 feet in seven seconds while the vessel progresses 100 feet; and suppose it does this with 200 horse power. No. 3 has a bow 200 feet long, it pushes the atom of water aside also 20 feet in 7 seconds while it progresses 200 feet or 20 miles an hour. No. 4 has a bow 250 feet long, and moves the atom of water also 20 feet in 7 seconds, while it progresses 250 feet in the same time or 25 miles an hour. And No. 5, with a bow 500 feet long, also moves the atom of water 20 feet in 7 seconds, while it progresses 500 feet in the same time, or 50 miles an hour. And if No. 1 moves the atom of water 20 feet in 7 seconds, it only progresses 20 feet in the same time, or 2 miles an hour; and in order to propel the latter vessel at 10 miles an hour, it would have to move the atom of water 5 times as fast as No. 5 would while the latter vessel is going 50 miles an hour; or, in other words, if No. 5 could travel at 250 miles an hour, and No. 1 at 10 miles an hour, they would both be moving this atom of water at the same speed.

And now as to the power required for each of these vessels. Suppose No. 2 with a bow 100 feet long and 200 horse power can travel at 10 miles an hour, No. 3 has the same duty to perform with respect to the atom of water while going 20 miles an hour, but the length of her bow is double that of No. 2, therefore she must have double power, or 400 horse power. No 4 turns the column aside in exactly the same time as the others, but in consequence of her increased length and greater duty, must have 500 horse power, and will travel 25 miles an hour; and No. 5 with 1,000 horse power will travel 50 miles an hour, her bow moving the column of water aside 20 feet

only in 7 seconds as before, while travelling at that high speed. While No. 1 will require 20 horse power to make her travel 2

miles an hour, her duty with respect to the column of water being as before 20 feet in 7 seconds, but the length of her bow being one-fifth of No. 2, reduces the necessary power to one-fifth of No. 2.

Most men would believe me if I say that I can propel No. 1 at 10 miles an hour under steam, but would disbelieve me if I say I can propel No. 5 at 50 miles an hour; yet the latter would be easy and the former almost impossible.

I have chosen the word *duty* instead of *resistance*, because I think the latter word inapplicable. I look upon the immersed side of a vessel as a wedge which has a certain duty to perform in a certain time, and think the word duty is more applicable, as we speak of steam engines doing duty so many pounds so many feet high per minute. By lengthening the bow it has more time in which to perform its duty, and by obeying the natural laws of motion that duty is reduced to a minimum.

As to the economy of the high speeds I have mentioned, I will take as an example the voyage from Dover to Calais, say twenty miles. No. 1 would perform this voyage in five hours with an 80-horse engine, and would require 30 cwts. of coals. No. 2, with 200 horse power, would perform the same voyage in two hours, with the same expenditure of coals, viz., 30 cwt. To drive No. 2 over in one hour would require 800 horse power, and consequently the fuel per hour would be increased fourfold; but as the voyage would be but one hour, she would expend twice the fuel in performing the voyage at twice the speed, viz., 3 tons. No. 3, however, would need only 400 horse power to enable her to perform the voyage in one hour, her expenditure of coals on the voyage being again 30 cwt. Thus No. 3, of twice the size of No. 2, can perform a voyage twice as fast as No. 2 with the same quantity of fuel. No. 4, with engines of 500 horse-power, would travel 25 miles an hour, and perform the voyage in 48 minutes, with the like expenditure of fuel: 30 cwt. And No. 5 would perform the same voyage in 24 minutes, with the same 30 cwt. of coals and 1000 horse power.

In the above calculations I have omitted the item of friction, and I think I may safely do so, as, although the amount of surface increases with the size, the friction per square foot decreases with the sharper lines.

In "Dr. Lardner's Railway Economy," published in 1850, the following remarks relative to American River Steamers occur: "The increase of the dimensions of these vessels has been attended with a greatly augmented economy of fuel. On comparing the *Hendrick Hudson* with the *Troy*, it has been found, that when the speed of the former is reduced to an equality with the latter, the former consumed 13 tons of coal while the latter consumed 20 tons; yet the displacement of the *Hendrick Hudson* is nearly twice that of the *Troy*." Again, "The results of their performance show that the resistance per square foot of midship section is not perceptibly increased by the increased length of the vessel, and the consequently increased surface and friction. This anomaly has not been explained, but it is certain that the increased length does not diminish the effect of the moving power in any perceptible degree."

The Doctor's anomaly I have attempted to explain in this paper.

Although I have given certain dimensions to my examples, I have done so only for convenience of calculation, and do not in the least bind myself to these figures.

Lastly, a few words on experiments. I have attentively examined in the British Museum the experiments on models tried at the end of the last century, and Mr. Bland's experiments on the forms of ships and boats. I have also tried a few myself. I find that if small models are propelled at a great speed, in proportion to their size they develope the advantages of the Wave system, but not at low speeds; the water requiring a very rapid oscillation to produce a satisfactory result. The reason of this is that the laws which govern the action of the pendulum govern all bodies capable of motion, and the diminutive bow of a model boat easily puts in motion a small quantity of water, without a hollow water line, at a low speed, and, unfortunately, does not furnish sufficient evidence for guiding us in the formation of large vessels. The larger the vessel is, the more important become the sharp lines, though the reverse of this has obtained hitherto, the cutter being sharp and the three-decker bluff bowed.

GNOLL COLLEGE, VALE OF NEATH.—The council of this college have at length elected their staff of professors, and commence operations in the course of October. The professor of mathematics is Mr. Arthur Cayley, F.R.S., and barrister-at law, late Fellow and Tutor of Trinity College, Cambridge, and moderator and examiner in that university. The chair of mechanics they have conferred on the Rev. C. B. Wollaston, of Exeter College, Oxford, vicar of Felpham, Sussex, and diocesan inspector of schools; and that of physics on the Rev. A. Bath Power. Professor Rodgers is to be professor of chemistry, while the chair of natural history will be filled by Dr. Spencer Cobbold, lecturer on botany at St. Mary's Hospital, Paddington; that of human history by the Rev. A. Wilson, late senior tutor of Leamington College; and that of design by Mr. E. H. Dehnert, member of the New Society of Painters in Water Colours. The professors will be assisted by resident tutors and lecturers.

STEAM BOILER FURNACES.

FIRST REPORT ON THE USE OF THE STEAM COALS OF THE "HARTLEY DISTRICT" OF NORTHUMBERLAND IN MARINE BOILERS.

To the Steam Colliers' Association, Newcastle-upon-Tyne.

GENTLEMEN,—1. The length of time that has elapsed since you confided to us the task of awarding the premium of 500*l.*, which you offered in 1855 for the best method of preventing smoke during the combustion of the coal of your district in marine engine boilers, has been so great, that we feel called upon to address you on the subject, although we are not yet in a position to report finally thereon.

2. The experiments which it was necessary to make required much time, as well as the construction of apparatus specially destined for the purpose; and at a very early period we became convinced that the only way in which we could satisfactorily decide the question referred to us, was to submit the designs brought before us, or such of them as we thought suitable, to trial on a boiler of the ordinary construction employed in steam vessels.

3. Our first step, therefore, was to have such a boiler built; then to ascertain its effective power as a standard whereto to refer the effects of the various smoke preventing systems; and, finally, by a comparison of these results with such standard, to determine how far any of them, and, if any, which of them, were entitled to the premium.

4. We much regret that we are still unable to come to a final conclusion on this matter; but as in the course of our experiments we have arrived at some facts which we think it important to your interests to be made known, we beg to lay them before you, reserving to a future, and we trust not a distant, period a more complete report upon the whole subject.

5. The results obtained establish the following facts:

1st. That the coal from your district, commonly called the "Hartleys," may be consumed in ordinary multitubular marine boilers without making any smoke.

2nd. That this may be done without the adoption of any of the various schemes which have been brought before us.

3rd. That it does not involve any loss of power or economy but that with a given boiler *more* water may be evaporated, whilst no smoke is made, than can be evaporated with the hardest firing on the usual system accompanied by a dense black smoke; and further, that the economic effect, or the quantity of water evaporated by 1 lb. of coal, is greater when no smoke is being made to the extent of from 17 to 22 per cent.

4th. That the combustion of the coal is perfect, and its evaporative power far beyond what has usually been ascribed to it.

6. The first two statements are proved by the evidence of the senses, and we can appeal to numerous eye-witnesses of the operations at Elswick for their confirmation.

7. The third and fourth are proved by the results of the experiments, which may thus stated:

First Series.

Work Done.	Hard Firing, Much Smoke.	Hard Firing, No Smoke.
Coal burned per sq. ft. of fire grate per hour	lbs. 18·50	lbs. 21
Water evaporated from 60 deg. Fahr. per sq. ft. of fire grate per hour	Cub. Ft. 2·197	Cub. Ft. 2·932
Total evaporation per hour from 60 deg. Fahr...............	Cub. Ft. 60·5	Cub. Ft. 83·5
Water evaporated from 212 deg. Fahr. by 1 lb. of coal...	lbs. 8·61.	lbs. 10·10

Showing *an increase of work done of* 38 *per cent. and a superior economy of fuel of* 17 *per cent. whilst making no smoke.*

8. In the above series of experiments we had—

Area of fire grate.... 28½ square feet.
Heating surface (total) 749 " "
Ratio of fire grate to heating surface .. 1 to 26½.

9. After this, an alteration was made in the boiler. The fire grate was reduced, and an apparatus attached, by means of which the feed water was partially heated by the waste gases of the chimney, making the proportion as follows:

Area of fire grate ...... 19½ sq. ft.
Heating surface boiler 749 "
Heater .... 320 "
1069 "
Ratio of fire grate to heating surface .... 1 to 55½.

10. The following table gives the results:

Second Series.

Work Done.	Hard Firing, Much Smoke.	Hard Firing, No Smoke.
Coal burned per sq. ft. of fire grate per hour	lbs. 21	lbs. 17·34
Water evaporated from 60 deg. Fahr. per sq. ft. of fire grate per hour	Cub. Ft. 2·909	Cub. Ft. 2·937
Total evaporation per hour from 60 deg. Fahr...............	Cub. Ft. 56	Cub. Ft. 56½
Water evaporated from 212 deg. Fahr. by 1 lb. of coal...	lbs. 10·06	lbs. 12·27

Showing *an increase of work of* 1 *per cent. and a superior economy of fuel of* 22 *per cent. whilst making no smoke.*

11. We have, therefore, no hesitation in saying, that the coals known as "Hartleys" may be consumed in ordinary multitubular marine boilers *without smoke, and with a large saving of fuel resulting from its prevention.*

12. The evaporative power of the coal, as above stated, is much beyond what is usually attributed to it, and this fact will doubtless be the more gratifying to you, as it may serve to correct an error of opinion which has resulted from the published "Reports on Coals suited to the Steam Navy," with the high sanction of the names of Sir H. de la Beche and Dr. Lyon Playfair.

13. In these reports the evaporative power of the coal under consideration is stated at 7·495 lbs. of water evaporated from 212° Fahr. by 1 lb. of coal, and of the Welsh coals, on an average of thirty-one kinds, at 9·24 lbs. of water per lb. of coal, the best of the Welsh coal being 10·37 lbs. per lb. of coal.

14. Some part of the great difference between these and our own results may doubtless be attributable to the different circumstances under which the coals were tried; but we submit that the results we have arrived at (the experiments being made with a boiler of the ordinary multitubular construction, as generally used for marine engines), are, *as practical data* superior to those made by the Government officials on a much smaller scale, and with an apparatus such as is never used for marine purposes.

15. We were not indeed called upon to pronounce upon the comparative values of the Welsh and North Country coals; but seeing the startling discrepancy between our results and those of the Government experiments, amounting to no less than 65 per cent. as regards your coals, we have felt it necessary to make actual trial of the Welsh coal in the same boiler.

16. These experiments are still in progress; and in our next report we hope to give the details, and to discuss fully the whole question.

17. We are at present, however, able to state that, under the most favourable conditions, the Welsh coal *does not exceed the Hartleys either in the amount of work done in a given time, or in economy, and under the general circumstances of steam navigation, falls short in both particulars.*

18. It will give us great pleasure if, in our next report, we are able to announce a still higher evaporative power in the North Country coals, resulting from some one or more of the plans for smoke prevention submitted to us; but it is only right to state that, from the analysis of the gases escaping from the chimney during the above recorded experiments, we can scarcely anticipate any considerable increase of calorific effect beyond what we have already obtained.

We have the honour to be, Gentlemen,

Your most obedient Servants,

James A. Longridge,
17, Fludyer-street, Westminster.

W. G. Armstrong,
Newcastle-upon-Tyne.

Thomas Richardson,
(Prof. of Chemistry) Newcastle-upon-Tyne.

Newcastle-upon-Tyne, Aug. 25, 1857.

PROTECTING THE SHEATHING OF SHIPS.

A Limited Liability Company has been established for the purpose of working certain patent methods of protecting the sheathing of ships. These methods are said to have been practically tested for some time past with excellent results, and a large quantity of copper prepared by the Company's process is now in whole or in part applied to several of Her Majesty's ships.

The chief of the patents possessed by the Company appear to be those of Mr. Wall, who bases his invention upon the principle established by Sir H. Davy's experiments in connection with this subject. It has remained for him, he says, to resume those experiments, and protect the copper by making it positive instead of negative.

This has been done by amalgamating the surface of the copper or yellow metal with a small portion of mercury, by which the whole surface of the copper is reduced to an uniform condition, preventing that difference between one spot and another which would constitute a voltaic circuit; and just as amalgamated zinc may remain immersed in weak acid, and undergo a very slow and steady oxydation (so slow that it amounts literally to protection) in like manner the copper is protected from any rapid oxydation; and, according to Mr. Wall's practice, copper or other metals used as ships' sheathing which under ordinary circumstances would be destroyed—say in one year—would last three or four years when protected by this process; the saving of copper being as between three and four to one.

A method of coating ships, the invention of Mr. Hay, the Government chemist at Portsmouth, has been successfully practised for several years. The nature of the invention has, we believe, been kept a secret. The new company would do well to secure this process if possible.

ON THE PRINCIPLE OF THE TRANSFORMATION OF STRUCTURES.*

By Professor Macquorn Rankine, LL.D., F.R.S.

This paper consisted of an explanation of some of the practical applications of a principle first communicated by the author to the Royal Society in 1856, viz.:

If a structure of a given figure be stable under forces represented by a given system of lines, any structure whose figure is a parallel projection of the given figure will be stable under forces represented by the corresponding parallel projection of the given system of lines.

By a *parallel projection* of a figure is to be understood any figure derived from the original figure by alteration of its dimensions, or by distortion; subject only to the condition that all straight lines in the original figure which are parallel and equal, shall be represented by parallel and equal straight lines in the new figure.

This principle applies to stability alone, and not to strength. It enables the properties of structures of complex and distorted figures to be deduced from those of other structures of simpler and more symmetrical figures. Thus, from the conditions of stability of a circular arch with a horizontal extrados, can be deduced those of the elliptic arch with a sloping extrados; and from the figure of an equilibrated arch for sustaining the pressure of water, equal horizontally and vertically, can be deduced the figure of an equilibrated arch for sustaining the pressure of earth, less horizontally than vertically in a given ratio.

* British Association, 1857.

THE SUBMERGING OF ELECTRIC TELEGRAPH CABLES.

During the sitting of the British Association, at Dublin, in section G, an elaborate discussion of various papers on machinery for lowering submarine telegraph cables occurred. Professor Rankine, LL.D., objected to the friction-brake as a means of controlling the speed of the machinery, on the ground of the impossibility of accurately adjusting or gradually varying its resistance, which is of uncertain amount, and subject to abrupt changes. He described the machinery patented in 1855, by himself and Mr. John Thomson, C.E., an engineer of great practical experience in laying submarine cables. It was stated by Professor Rankine, that two of the chief peculiarities of that invention were, the substitution of grooved pulleys for cylindrical drums (an improvement which was said to have been used by the Atlantic Telegraph Company), and the employment instead of the friction-brake of the hydraulic brake, in which the resistance, being that of a fluid forced through a valve, can be accurately adjusted, and cannot vary abruptly. He considered that the use of the hydraulic brake would prevent such accidents as that which had recently occurred to the Atlantic cable.

It should be understood that, while it is quite true that Professor Rankine and Mr. Thomson patented, in the early part of 1855, an invention which comprised the employment of a certain arrangement of grooved pulleys for laying submarine cables, the arrangement used by the Atlantic Telegraph Company was by no means the same as theirs, and of course the use of such pulleys for similar purposes, under some arrangement or other, is universal. We offer this explanation simply to prevent mistakes, and with no desire whatever either to detract from the merits of Professor Rankine's invention, or to imply that the reading of his paper was inopportune.

*To the Editors of the Mechanics' Magazine.**

Gentlemen,—I have to beg Captain Blakely's pardon, if, in imputing to him "mental hallucination" in reference to his mathematical theory of the submerging an electric telegraph cable, I caused a more unpleasant impression than would have been produced, by simply saying that he was in error; and having to controvert his statements, I could not have said less—for all *creditable* erroneous opinions must arise from a hazy state of our mental perceptions as to what is truth.

Captain Blakely puts the case of two vessels with the cable between them, "starting off in opposite directions at a rate of say three miles an hour each, and that the cable sinks at precisely the same rate." He thence infers, and truly enough, that when the distance between the vessels is two miles, "the least possible amount of cable payed out will be $2 \times \sqrt{2}$, or nearly three miles." Now this is put to controvert my assertion, that "A vessel depositing a cable whilst over a level platform of the ocean, will lose none of it for any other reason than because the cable sinks faster than the vessel moves;" consequently he must imply, that this rate of expenditure in the cable will continue the same when it

* We have been compelled to greatly abridge this letter, as our space is too much occupied just now to admit of literary, or even scientific, elaboration. If any of the passages expunged appear to the writer to be essential to his rejoinder, we shall feel regret. We, at all times, prefer our correspondents to condense their own papers.—Eds M. M.

reaches a level bottom. If there could be any doubt on this point, it would be dispelled by the extract from the *Athenæum*, which a correspondent has sent you. (See p. 301, No. 1781.)

The mathematical inference in Captain Blakely's supposed case, as to the additional amount of cable required beyond the horizontal distance traversed, to supply the other distance in depth, is not of course to be disputed; but when the bottom is reached, what then? Is this circumstance to have no influence on the expenditure of the cable?—do the physical conditions of the problem remain the same?—or have we here an instance of mathematical forgetfulness and hallucination? In the first stage of the operation the extra demand for cable is an imperative necessity, if it is to sink and not to float; but in laying it along the bottom, unless where greater depths are to be sounded, there is no "mathematical impossibility" why this extra demand, which would only then commence to be "a waste," should not be avoided, it being now merely a contingency, depending on the structure of the cable, its degree of inclination, the strain to which it is subjected, and other circumstances. I know very well that the mere mathematical relations of the sinking cable, considered as isolated parts, and as falling bodies, will continue the same in both stages of the operation; and that abstractly in this sense, as much cable will be required as before; but not, however, any longer as a necessary and imperative condition; and, therefore, it is at our own option whether we permit it to be so expended. It may comport with the habit of indulging in an abstract mathematical view of things, to consider the cable as disconnected particles, sinking in perpendicular lines, and so accumulating lineally at the bottom; but the practical man must not omit taking into account one single circumstance of the case, and thus he sees that the somewhat rigid continuity of the cable comes into play when the bottom is reached, and that being payed out at an angle of 45°, it finally sinks very nearly as a rod would do; consequently each particle, instead of sinking mathematically as it ought to do, in perpendicular lines, will perversely sink practically in curve lines, and occupy as much lineal space at the bottom of the ocean, as if laid out upon its surface. Of course the degree of inclination of the cable is a material circumstance in the case, and we have seen that, to avoid waste, the angle cannot be less than 45°, for the vessel must move at least as fast as the cable sinks; but to be on the safe side, and to render needless any assisting strain on the cable, unless to a very small amount, it would be practically desirable to accelerate the speed of the vessel, to say twice the velocity of the descent, and obtain a corresponding diminution in the inclination of the cable.

It is not, then, by the mathematical, but by the true physical theory that we must practically abide, if that be the only one which conforms itself to the changed and actual circumstances of the case. Had Capt. Blakely even thought of the influence which the continuity of the cable would have on his problem, his mathematics would have been at fault, in attempting to grapple with it under all circumstances of the angle of inclination; and so, by oversight or by purpose, he has taken the usual mathematical course, of solving it on the easier principle of falling bodies, however inapplicable to the more important stage of the case; and, as usual, he has stumbled on a practical fallacy; but, as usual also, routine thinkers will indorse it, because of the prestige which mathematical authority and a mathematical process imparts to it.

It is gratifying to observe, that it was not in section G, where the practical talent of our country assembles, that this "new light" illuminated the minds of the members. I must add, in justice to Capt. Blakely, that it does not appear whether it radiated from his paper, or whether the reading of it was only the occasion of its being kindled.

I am, Gentlemen, yours, &c.,

BENJ. CHEVERTON.

ON INCONGRUOUS SOLUTIONS.

BY JAMES COCKLE, M.A., F.R.A.S., F.C.P.S., ETC.,

(*Continued from vol.* lxv., *p* 296.*)

The *data* of the following example involve radicals.

Ex. VIII. A pole thirteen feet long is broken in two. The end of one piece rests on the top of an upright post a yard high. The distance of its other end (which rests on the ground) from the foot of the post is equal to half the length of the other piece of the pole. Where is the pole broken?

Let x be the distance of the end which rests on the ground from the foot of the post. Then the conditions of the question give

$$13-2x=\sqrt{x^2+9};$$

or, squaring both sides, transposing and

* The following corrections should be made in col. 1 of p. 294 of vol. lxv.:
Line 5 from the bottom: *for* "right" *read* left.
Line 2 from the bottom: *for* "left" *read* right.

adopting the notation of vol. lxii., p. 510, col. 2,

$$4(-x)^2-x^2+52(-x)=9-169(+1)^2.$$

Now, assuming that this last equation is equivalent to

$$3(-x)^2+52(-x)=-160(+1)^2,$$

multiplying it into 3, and completing the square, we find

$$(26-3x)^2=196(+1)^2,$$

whence

$$26-3x=14, \text{ or } x=4.$$

Consequently the pole is broken into two pieces of the respective lengths of eight and five feet. This, the "theoretic" solution, is also the congruous one: the other, which gives

$$26-3x=-14, \text{ or } 3x=40,$$

is incongruous.

The theoretic solution does not, however, guide us to a congruous one in all cases where radicals are involved.

Let

$$A=ax+b,\ B=cx^2+dx+e,$$

and let it be required to solve

$$A=\sqrt{B}\ldots\ldots\ldots\ldots(5),$$

giving a positive sign to the radical.

In such a case, if both values of x render A negative (5) cannot be satisfied by the ordinary symbols of algebra. If one, or two, values of A be positive, then (5) admits of one or two solutions respectively.

Mr. Samuel Bills, of Hawton, near Newark-upon-Trent, proposes* to treat (5) as follows:

By means of the first of the equations

$$A=ax+b,\ A^2=B,$$

he eliminates x from the right hand side of the last, and solves the resulting quadratic in A. He observes that when (5) has two, one, or no solutions, A has two, one, or no positive values.

Applying this process to my example, we are led to

$$3A^2+26A=205,$$
$$\text{whence, } 3A=15 \text{ or } -41,$$

and the example admits of only one solution, obtained from the positive, which is also the "theoretic" value of A. Mr. Bills's method is attended with this advantage, that from the positive value or values of A, we obtain the congruous solution or solutions without having to subject them to a preliminary trial. Every positive value of A leads to a congruous solution of (5) and every negative value to a corresponding solution of its congener.* The signs of the terms of the quadratic in A will often enable us to ascertain by inspection whether the proposed equation admits of solution, and this test has been employed by Mr. Bills.

I have not thought it necessary to give further examples in illustration of the theoretic solution, although one is now before me.—Ex. (2) of page 183 of Professor J. R. Young's "Introduction to Algebra."

This is not the proper place to enter upon the interesting inquiry whether all impossible equations may not be reduced to a single fundamental case.† Perhaps every such equation may be expressed as a function of one elementary form, or by modifications of one impossible symbol. That symbol would then fulfil functions analogous to those of the unreal $\sqrt{-1}$ of ordinary algebra.

White Cottage, Felixstowe,
near Ipswich, Suffolk,
September 4, 1857.

* In a letter to me, dated June 17, 1852, and received by me about that time. I have given the substance of Mr. Bills's process, without adhering to his notation or words. His letter is illustrated by several examples.

* In a subsequent letter (dated Oct. 14th, 1856,) to me, Mr. Bills remarks, that if

$$x+1+\sqrt{3x^2+3x+2+\sqrt{M}}=0\ldots.(a)$$

where

$$M=5x^4-6x^3+40x^2-48x+25$$

we are led to a biquadratic in x, of which the roots are 1, 2, 3, and 4, but, he adds, that none of these values will satisfy (a) when the radicals are taken positively, and that (a) has no root.

I have not seen Mr. Finlay's paper, and I am indebted to the Rev. R. Harley for my reference to it (lxii. 509). Mr. Harley informed me by letter, that Mr. Finlay's discussion embraces not only an irrational equation containing a single radical of any order, but also an irrational equation containing two or more radicals of any order, the object being to ascertain, in all cases, and *à priori*, the number of impossible roots, and to determine the possible ones. The principle of Mr. Finlay's method is, I believe, identical with that on which the solutions proceed which I have quoted from the *Vija-ganita*—(*Mech. Mag.* xlix. 555—7). Mr. Finlay's views, like mine, extend to impossible equations with unreal roots. When Mr. Finlay wrote his paper, he had not, I believe, seen those solutions, nor had Mr. Harley's remarks on them been read before the Manchester Philosophical Society.

† For instance, to the form of the fundamental equation of my tessarine algebra, or of an equation of the species which I have proposed to substitute for it, but on which, it appears to me, the tessarine system might be made to rest as satisfactorily as on the other.

THE KINGS OF SIAM.—Mr. J. Taylor, of Birmingham, has manufactured for the British Government a hydraulic press of great power, for the compression of cotton; and a set of coining machines, with dies, &c., complete. They are for presentation to the Kings of Siam. A gentleman who has had a good deal of personal intercourse lately with these kings, informs us that they evince great love for science, and are proud of their friendship with this country.

TONNAGE AND STEAM SHIP REGISTRATION.

We have received a letter from Mr. Atherton requesting us to insert the tables attached to the paper which we published in No. 1778, and intimating that he will then have much pleasure in responding to our editorial article of last week. We conceive that we have given our readers a sufficient idea of these tables in the remarks we have offered upon them. It cannot be a matter of much importance to show in a tabular form how the changes may be rung upon a number of imaginary vessels arising from various combinations of length, breadth, and depth, to all of which the same empirical formulæ for obtaining the several constructive elements are applied. The principle, such as it is, is all that our readers are concerned with, and that we have "exposed."

Mr. Atherton mistakes the position which we occupy, as editors of the *Mechanics' Magazine*, if he imagines that we are not to use our own judgment with regard to the matter which we think it important to submit to our readers. We wish to spare them the insertion of unnecessary matter. We beg also to inform Mr. Atherton, that he labours under a misapprehension in supposing that we regarded his paper as meriting notice, *per se*. Had its intrinsic merits alone been concerned, we should never have troubled ourselves with it. It was the part which, by some means or other, the statistical section of the British Association was induced to take with regard to it, that alone induced us to bring it before the notice of our readers.

Should Mr. Atherton think it worth his while, after this announcement, to reply to our strictures, we do not pledge ourselves either to insert or to reject his reply; we shall certainly, however, exercise our editorial prerogative of judging if any part, or how much of it, is likely to interest our readers, or is worthy of their attention.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Are not your strictures upon poor Mr. Atherton too severe? Naval architects, and those engaged in managing the marine of this country, speak of him as the "navvy" spoke of his wife when she thumped him. He said, "It amuses her and it does not hurt me." So we say Mr. Atherton's *escapades* amuse him and they do not hurt us.

With regard to "freeboard," or height of gunwale above the water, what is the fact? I have known the same ships in the Quebec trade in the summer and the coal trade in the winter. When timber laden they have had a considerable quantity of "freeboard," but on account of the centre of gravity of the whole floating mass coming too near to the *metacentre*, the ships have had but little stability, indeed have been on their beam ends nearly all the passage home. When in the coal trade, they have been immersed nearly three feet deeper; indeed, the midship parts of their gunwales have been within two feet of the water, and, on account of the distance between the two centres named being increased, considerable stability has resulted, and the ships have been, to all intents and purposes, *much more seaworthy with less "freeboard."*

If too much stress be laid upon "freeboard," the result will be increased depth in proportion to beam, which would be the most pernicious change that could possibly be made.

The *W. S. Lindsay* and other ships which have had too much depth for their "beam," have not been deficient of "freeboard;" on the contrary, they have had too much of it.

There is a ship at this moment in this port being cut down; that is, having part of her spar (or uppermost) deck, cut away in midships, so that she will have "poop," "waist," and "forecastle," instead of a flush deck. Her "freeboard" will be diminished considerably, but she will be rendered a much safer ship.

If too much regard for "freeboard" obtains, we shall find ships will take too little "dead weight," will load almost entirely with light measurement goods and be *crank*. The mischief that would result is incalculable.

It may seem a paradox to our *quasi* naval reformers, that if a ship be brought to her load draught with a heavy cargo, before her hold is full, that a few light goods put upon this heavy cargo would render her a safer ship at sea, although increased draught of water, and diminished "freeboard" would be the concomitants.

I am, Gentlemen, yours, &c.,

Nauticus.

THE LARGE MORTARS AT WOOLWICH ARSENAL.

To the Editors of the Mechanics' Magazine.

Gentlemen,—No error spreads with such mischievous rapidity as one originating with an authority generally relied upon for truth and accuracy. In the August Part of the *Mech. Mag.*, at page 206, I remark you have transferred from the pages of the *Times* verbatim certain notices of the large mortars made from my designs for Government, and now at Woolwich Arsenal, preparatory to trial. I will be obliged by your enabling me, by the publication of these few lines, to

correct the many mis-statements of the *Times'* notice.

There is no such firm as Messrs. Mallet, of Blackwall, or Messrs. Mallet and Company, as a subsequent *Times'* notice creates. The execution of the two 36-inch mortars, when sanctioned being constructed, were contracted for by the late firm of C. J. Mare and Co., of Blackwall, and, after much delay, owing to the bankruptcy of that house, have been completed chiefly by the assignees. Certain parts of the mortars, however, having been separately executed by the Mersey Steel and Iron Company, Liverpool (the makers of the 13-inch wrought-iron gun), and by Messrs. Faucett, Preston, and Co., engineers, also of that town, under my directions.

For the designs, specifications, and methods of construction adopted in those mortars I have the entire responsibility. It is owing to the inquiring intelligence, energy, and courage of Lord Palmerston, supported, as I have reason to believe, by the well-informed mind of another illustrious personage, that these designs have become realizations, and now await experiments which, if successful, will place in the hand of England a weapon far surpassing in power any ordnance of its species before possessed by any nation. The heaviest separate piece for transport does not weigh 20 tons, nor *very* much more than the half of it. The shells (which in flight weigh a good deal above a ton and a quarter) were cast by the Lowmoor Iron Company, Yorkshire.

I am, Gentlemen, yours, &c.,
ROBERT MALLET.

Sept. 21, 1857,
Delville County, Dublin.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

NEWTON, W. E. *Certain improvements in sewing machines.* (A communication.) Dated Jan. 19, 1857. (No. 162.)

The object here is—1. To obtain an universal feeding movement to feed the cloth in any direction, and to change the direction as often as may be desired. This part consists chiefly in confining and giving motion to the material between the face of a rotating disc or plate, through and in line with whose axis the needles work. 2. The second improvement is only applicable to these machines in which the stitch is made with two threads by the combined operations of the needle and shuttle. This consists in providing for any slight variation of the direction of the motion of the shuttle that may be necessary to bring the shuttle in proper relation to the needle, by fitting the shuttle with grooves to run upon two parallel ways or guides, adjusted laterally on a block which is adjustable in a direction perpendicular to the adjustment of the ways or guides.

NEWTON, A. V. *An improvement in the manufacture of hosiery.* (A communication.) Dated Jan. 20, 1857. (No. 163.)

This relates to a certain mode of operating to form the heel or round part of a piece of hosiery, and the toe also, if desired, without a seam, by knitting continuously from the leg towards the foot, or from the foot towards the leg, the advantage of which is that the work in its progress need not be removed from the needles.

CALVERT, F. C. *The use or application of certain substances in stiffening, sizeing, or otherwise preparing textile fabrics and paper.* Dated Jan. 20, 1857. (No. 164.)

This consists in the use of vegetable mucilage as a substitute for bone or animal size in stiffening, sizeing, or otherwise preparing these materials.

KIENTZY, V. N. *Improvements in machinery to be worked by steam or other power, for clearing and ploughing land.* Dated Jan. 20, 1857. (No. 166.)

This cannot be described without engravings.

JOHNSON, T. *An improvement in purifying alkaline lees.* Dated June 20, 1857. (No. 167.)

This consists in applying atmospheric air in numerous streams, forced by an air-pump or blowing apparatus through and amongst such lees.

BARLOW, W. H., and H. WOODHOUSE. *Improvements in the permanent way of railways.* Dated Jan. 20, 1857. (No. 169.)

This consists in a method of attaching rails to their sleepers. The patentees employ clamps of metal, having their ends turned inwards, so as to embrace the sleeper and pass over and clip the bottom flange of the rail. These side clamps are secured to the sleeper by a bolt passing through the clamps and the sleeper, or otherwise, to support the ends of railway rails when such ends are fished. In the channels of the two ends to be connected they employ two one-jaw chairs, one placed at each end of the fish plates, and the rails and fish plates are fastened to the jaw of the chair by means of bolts passing through them. If flat-bottomed rails are used without chairs, they lengthen the fish plates so as to let them rest at each end over the sleepers, or they put the sleepers closer together with the same object. When they use transverse sleepers of cast iron, they make them in halves or portions, which are coupled together between the lines of rails. And when using railway chairs with transverse sleepers, they form the under parts of the chairs with

projecting plates attached thereto, and turning downwards over the sleeper. And the projecting plates may be further extended to bear on the ballast. The patentees bolt the fish plates to the chairs in place of the rails, and employ chairs having a V formed opening. Through this chair the rail and fish plates pass. The fish plates are formed with inclines at the back, so as to correspond with the inclines inside the chair, and bolts pass vertically through the backs of the fish plates to the under part of the chair. It will be seen that as these bolts are screwed up the inclines act to press the fish plates against the rails.

JOHNSON, J. H. *Improvements in apparatus for the preservation of money, books, papers, and other property, in case of disaster to ships and other vessels.* (A communication.) Dated Jan. 20, 1857. (No. 172.)

This consists in the use of a box or case to serve as that part of a safe used as the receptacle, and in so placing this case or box within another of larger size as to obtain a space between the inner and outer case on all sides, excepting where the entrance to the receptacle and its doors are situated. The patentee prefers that this space be subdivided into numerous air-tight cells. Since the object of the space is to obtain buoyancy, the cells are either kept empty or filled with cork.

MASSEY, J., and J. HARGREAVES, jun. *Certain improvements in machinery or apparatus employed in the preparation of cotton and other fibrous materials for spinning.* Dated Jan. 21, 1857. (No. 174.)

This relates principally to drawing frames, and consists in the application of an apparatus thereto for stopping the drawing rollers when the sliver (passing between them) breaks at any point between the drawing and delivering rollers, or when the cotton accumulates or laps round the drawing rollers. This is effected by a lever or beam balanced near its centre, and bearing at one end a table or tray extending from the drawing to the delivering rollers, the sliver passing above it. The opposite end of the lever is in connection with a stop motion, part of the lever being extended and provided with a screw and nut for adjusting the balance of the lever, &c.

CHAMBERLIN, H., jun. *Improvements in implements or apparatus for ploughing, tilling, or cultivating land.* Dated Jan. 21, 1857. (No. 175.)

This apparatus consists of screws large enough to cultivate the earth to a sufficient depth drawn through the earth in the direction of the length of its axis, and caused to rotate, and at the same time to cut, turn over, break up, and pulverize the soil at one and the same time.

DYER, S. *Certain improvements in ships' fittings, such as mast-hoops, jib-hanks, and jib and other travellers.* Dated Jan. 21, 1857. (No. 179.)

This consists in improvements in the construction of ships' fittings, such as mast hoops, jib hanks, and jib and other travellers, whereby the patentee secures the sails of ships. The improvements cannot be described without engravings.

NEVILLE, S. *Improvements in machinery or apparatus employed in the annealing of glass and the firing of pottery ware.* Dated Jan. 21, 1857. (No. 182.)

This invention was described and illustrated at page 105, of No. 1773.

HARRIS, T. *Improvements in apparatuses for refrigerating or cooling, and regulating the temperature in worts and beer, which may also be employed as condensers in distilling.* Dated Jan. 21, 1857. (No. 183.)

This consists in fitting in a suitable vat or cistern series of chambers with division plates, so as to establish two separate and distinct ascending and descending passages or ways through the cistern, one being for the reception and passage of the wort or beer entering at one end of the cistern, and passing through and out of it, and the other for cold or hot water, steam, or heated air, according to the operation required, entering at the opposite end, and passing through and out of the cistern. For the condensation of spirits cold water only must be made to flow through one passage way, while the spirits flowing through the other passage will become condensed. In this case the cistern must be closed.

CATER, H. *Improvements in steam boilers.* Dated Jan. 21, 1857. (No. 185.)

The patentee causes the vapours and gases from the fire place to pass through a series of tubes in the lower part of the boiler. The gases and vapours, after having given off a portion of their caloric to the water surrounding these tubular flues, escape from the ends thereof into a chamber at the other end, and then return again through another set of tubular flues of less diameter than the former set. This second set is placed in the boiler above the first set.

MEDLOCK, H. *An improved method of purifying water.* Dated Jan. 21, 1857. (No. 186.)

This consists in placing the water, previously to its filtration, in a vessel, and there allowing it to remain in contact with certain solid bodies, until the precipitation of organic matter occasioned by such contact ceases. After which any of the precipitate occasioned by the aforesaid process which may remain suspended in the water, should be removed from the water by subjecting

the water to filtration in the ordinary manner. The solid bodies preferred are metallic bodies, and the metal preferred is iron.

DELSARTE, F. A. N., and E. VALIN. *Improvements in pianos and other stringed musical instruments.* Dated Jan. 22, 1857. (No. 188.)

This consists in the application to pianos, &c., of tuning forks, bells, or other sonorous bodies for rendering the tuning of the instruments more easy and accurate. It is partly an improvement on the patent obtained by M. Delsarte, on the 12th Oct. 1854.

WARNE, J. *A new combination of metals applicable to decorative and useful purposes, part of which invention is applicable also to the method of combining metals and alloys of metals.* Dated Jan. 22, 1857. (No. 189.)

This consists—1. In forming a new combination of metals applicable to covering the tops of bar or shop counters and tables, by soldering or fusing together the following metals or alloys to produce a hard metallic surface resembling silver. The alloy employed for the surface consists of block or ingot tin, nickel, bismuth, and cobalt. 2. In a method of soldering or uniting by fusion alloys of metals. The first metal or alloy in a liquid or fused state is to be poured into a vessel to the required depth, and when just set, a heated perforated metal plate is placed upon the surface to fuse the same. As soon as the metal or alloy rises through the perforations the plate is withdrawn, and the second metal or alloy is poured in.

ENGSTRÖM, C. C. *Improvements in the construction of projectiles for rifled guns and mortars.* Dated Jan. 22, 1857. (No. 192.)

This mainly consists in constructing the wings of such projectiles of wood.

RUBERY, J. *Improvements in runners, top-notches, and other parts of umbrellas and parasols.* Dated Jan. 22, 1857. (No. 193.)

This consists in making the notches of runners, and also in making top-notches of umbrellas and parasols of malleable cast-iron; and in producing these articles they are cast and annealed, and then shaped, cut, and finished.

TERMINI, G. P. DI. *Improvements in the construction of artificial hands.* Dated Jan. 22, 1857. (No. 194.)

This consists in arranging artificial hands with fingers which nip anything which the wearer may desire to take hold of. The end of the arm or stump is furnished with a six-sided projection, which fits into a suitable socket, having on its exterior a series of inclines or screw threads, which work with a corresponding nut, so that by giving to the arm or stump a partial rotation this nut is raised or lowered, and its motion is by levers communicated to the fingers.

JOHNSTONE, R. *Improvements in the manufacture of firewood for lighting fires.* Dated Jan. 22, 1857. (No. 197.)

This consists in dipping short lengths of firewood in a compound of adhesive and inflammable matters, and in building up of the pieces an open structure between which flames may readily play and pass. The compound used consists of pitch, salts from dead oil, obtained in distilling coal tar, and the solid oil from pitch.

ROBERTS, W. *Improvements in arranging ships' and other similar pumps.* Dated Jan. 22, 1857. (No. 198.)

A hollow conical plug is placed at the end of the suction pipe of the pump. This plug turns in a suitable socket, like an ordinary cock, and in the sides of the socket is a series of slits communicating with one of the pipes with which the suction pipe is to be connected. In the side of the hollow plug is a single slit, which, by turning the plug, can be brought opposite to either of the slits in the socket, and thus communication is made.

WIMSHURST, H. W. *An improved mode of manufacturing sheet metal.* Dated Jan. 22, 1857. (No. 199.)

The chief object here is to manufacture lead foil quickly and economically; but the patentee also proposes to apply his improvements to the manufacture of sheet metal of various kinds, using however only three metals or alloys fusible at a low temperature. The lead, while molten, is run from a height into a die box, fitted with lips, so adjusted that a free longitudinal space is preserved between them for the exit of the metal. The pressure from above will cause the metal to exude between the lips in the form of a thin sheet, which is then conducted to adjacent pressing rolls, whereby it is reduced to the required thickness.

MARSHALL, J. G. *Improvements in preparing flax, hemp, china grass, and other vegetable fibrous substances.* Dated Jan. 22, 1857. (No. 200.)

This relates—1. To the preparation of a peculiar soap to be employed in the treatment of flax, &c. 2. To the admixture with the soap in solution of naphtha or turpentine for dissolving the gummy or resinous matters adhering to the fibres. In the preparation of the soap, the patentee employs the oleic acids of oils and fats.

HEMINGWAY, A., and T. WHEATLEY. *Improvements in slide-valves for steam engines and other purposes.* Dated Jan. 23, 1857. (No. 202.)

This consists in the application of a second slide-valve to the ordinary slide-valve, the said valves being of different areas, and connected by a link or otherwise. The steam acts on both the valves, and the

second being of less area than the other, the pressure on the latter valve is only equal to that due to the excess of its surface.

Bedson, G. *Improvements in coating iron and other metal with metals or metallic compounds.* Dated Jan. 23, 1857. (No. 203.)

The articles are passed through a bath of the molten metal intended to form the coating, and floating upon the bath are salts of zinc (the chloride or sulphate).

Vasserot, C. F. *An improved gasogene.* (A communication.) Dated Jan. 23, 1857. (No. 204.)

This consists of a vessel made of ware, having a partition piece from top to bottom. The pouring lip is so formed that it opens into the two compartments, so that on pouring the liquid from the vessel the solutions mix and form an aërated beverage.

Eskholme, G., and H. Wilkes. *Improvements in ball and other cocks.* Dated Jan. 23, 1857. (No. 207.)

This consists in the use of a certain hollow or tubular plug for ball and other cocks, such plug forming the water way for the supply of water.

Fontainemoreau, P. A. L. de. *Certain improvements in fire arms, and in the bullets to be used therewith.* (A communication.) Dated Jan. 23, 1857. (No. 208.)

This consists—1. Of a peculiar form of breech cylinder, applicable to guns and carbines. 2. Of a peculiarly shaped bullet, to be used in connection with the same.

Powell, J. F. *Improvements in reverberatory and other furnaces.* Dated Jan. 23, 1857. (No. 209.)

This consists in a mode of regulating the supply of air to the fire-places of furnaces, by closing the upper portion of the ash-pit in front by a flap, or by folding doors, or by having numerous openings in the lower part of doors entirely closing the ash-pit in front, &c.

Wilson, G. F. *An improvement in the manufacture of night lights.* Dated Jan. 23, 1857. (No. 210.)

This consists in the application of the more solid matters obtained from rangoon or such like petroleum in the manufacture of night lights.

Balestrini, P. A. *Improvements in electric telegraphs.* Dated Jan. 23, 1857. (No. 211.)

This invention will be described in an early number.

Wilson, G. F. *Improvements in the manufacture of candles.* Dated Jan. 23, 1857. (No. 212.)

This consists in the combination of cocoa nut, or calhoun, or palm kernel oils or their stearines, with the solid matter obtained from rangoon or such like petroleum, and applying compounds thereof in the manufacture of candles.

Ayles, T., and R. A., jun. *Improvements in the construction of ships and other vessels navigating on water.* Dated Jan. 24, 1857. (No. 213.)

This consists in strengthening and making of smaller dimensions than usual the framework of ships, by attaching to one or both sides of all or any of the timbers, iron plates, or bars of iron. Also in filling in solid and water-tight the spaces between the several ribs or frames of the vessel in certain places, so as to prevent any water that may accumulate between the outer and inner planking from flowing from one part into another.

Sharkey, P. H. *Improvements in the construction of scale-beams or balances.* Dated Jan. 24, 1857. (No. 214.)

The object here is to reduce to a minimum the friction on the centres and pivots of scale-beams and balances by fixing into the beam three V shaped cast steel centres, one in the centre, and one at each end. The patentee makes the suspending frame with boxes at each end, the suspenders being separate pieces. Into the whole of these boxes he fits bushes of highly polished agates, or other hard stones, or hardened steel, each forming half a circle, with plates of similar material fitted at the back or ends of the boxes for the ends of the pivots to work against, and he secures the bushes in place with gutta percha, or soluble cement.

Whines, J. *Improvements in machines for dovetailing, grooving, slotting, and rabbeting.* Dated Jan. 24, 1857. (No. 215.)

This invention was described and illustrated at page 97 of No. 1773.

Harris, J. *An improved method of stopping or retarding railway carriages and trains, locomotive and stationary engines and machinery, together with certain apparatus which may be employed therein.* Dated Jan. 24, 1857. (No. 216.)

This invention consists in working the brakes by means of compressed air having as prime mover an air pump fixed to the framework of the engine or tender, guard's van, or other carriage. Each air pump is worked by a crank either direct from the axle or by the guard or driver. The other parts consist of a cylinder, piston, and connections attached to the brakes in each carriage.

Wiggs, C. J. *An improved apparatus for feeding or supplying steam boilers with water.* Dated Jan. 24, 1857. (No. 218.)

This consists in combining with the ordinary water float certain self-acting mechanism, constituting apparatus for feeding boilers with water, without the aid of a force pump.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

QUIN, R. *Improvements in stereoscopes.* Dated Jan. 20, 1857. (No. 168.)

The front and back of the instrument are hinged to the top containing the eye pieces, and are connected at the sides by flexible gussets, so that they may be folded down. To the back a stiff partition is hinged, which turns up so as to keep the front and back at a suitable distance apart when set up for use. To the front of the instrument is attached a reflector. The instrument forms a small portfolio or box, suitable for containing stereoscopic pictures.

BOYLE, T. *Improvements in outside reflecting lanterns.* Dated Jan. 20, 1857. (No. 170.)

The inventor first makes a concave circular reflector, and to it adds on the exterior of the frame a chimney of the ordinary construction, communicating with an aperture in the reflector, two iron wire prongs at the back to fit the corresponding sockets in the gas pendants at present in use, and a transparent front of glass.

JOHNSON, J. H. *Improvements in apparatus for the preservation of life and property at sea.* (A communication.) Dated Jan. 20, 1857. (No. 171.)

This consists in making a box which shall serve as a berth or bedstead, or as a sofa or settee, and which, in case of need, shall answer the purpose of a life-boat. The box work is made hollow at its bottom and both ends; the hollow ends are extended upwards above the sides, so as to return them both instantly to a vertical position in case of being in any way overturned.

JACKSON, L. D. *An improved beer engine or syphon and vent-peg, to be used for the purpose of drawing or pumping ales, beer, or other fluids.* Dated Jan. 21, 1857. (No. 173.)

This beer-engine is a contrivance for drawing up ales, beer, or other fluids, and may be constructed to discharge from the same outlet as many different kinds of ales or other fluids as may be desired. The vent peg intended to be used in connection with the beer-engine is made as a screw, with a head and a valve in the head acting on the passage which passes through the screw.

LEDURE, E. J. B. *An improved railway break.* Dated Jan. 21, 1857. (No. 176.)

This relates to the application of the rotating power of each wheel of a railway carriage as its own brake, by means of eccentrics fixed on the axle, the action being so regulated, that the pressure of the brake or rubbing surface may either be applied suddenly or progressively, as required.

SCOTT, W. C. *Improvements in apparatus for separating coin.* Dated Jan. 21, 1857. (No. 177.)

These relate to apparatus for sorting and separating different sizes of coin from each other. In a suitable frame or case are placed a series of screens or sieves, each having holes adapted to pass or retain the different sizes of coin required to be separated. These separating screens are so disposed that the coin which passes one, falls or is conducted into the next.

AITCHISON, R. K. *Improved apparatus for the amalgamation of precious metals.* Dated Jan. 21, 1857. (No. 178.)

This relates to an apparatus adapted for the amalgamation of gold and silver with mercury for separating such metals from crushed ore, &c. The apparatus consists principally of a steam-tight vessel divided into compartments, and furnished with means by which steam forces the crushed ore from one compartment to another through the mercury.

BROOMAN, R. A. *Improvements in the manufacture of lubricating compositions.* (A communication.) Dated Jan. 21, 1857. (No. 181.)

This consists in the employment of an oxide (other than potassa, soda, and ammonia), or super-oxide, or of a metallic salt, combined with tallow, or other neutral fatty matter, so as to form a fatty salt, metallic or not, according to the oxide used. This composition is diluted or not, according to the uses to which it is to be applied, with shale oil, or with any other oil essential, volatile, mineral, or otherwise. Carburets of hydrogen, balsams, bitumens, neutral fats, and resins, are also occasionally mixed (one or more of them) with the fatty salt.

NEWTON, A. V. *Improved means of transmitting messages by audible signals.* (A communication.) Dated Jan. 21, 1857. (No. 184.)

This relates to the use of a steam or other powerful whistle for producing sounds of varying duration.

BOWER, L. *An improvement or improvements in the manufacture of bolts, rivets, spikes, screw-blanks, nuts for screws, and washers.* Dated Jan. 22, 1857. (No. 187.)

This consists in the manufacture of bolts, rivets, spikes, screw-blanks, &c., by the use of stamps, hammers, &c., that is, a heavy body raised to a suitable height and allowed to fall. The inventor attaches to the under side of the stamps or hammers and the bed of the stamp suitable dies.

BROOMAN, R. A. *Improvements in the preparation of oil for lighting, and in lamps, glasses, or chimneys to be employed in burning the same.* (A communication.) Dated Jan. 22, 1857. (No. 190.)

This consists in a certain mode of treating

resin oils in such manner as to prevent them from readily freezing and giving off smoke and unpleasant odours while being burnt, and also in improvements connected with the chimneys of lamps for burning oil so treated.

MANDER, E., and W. MORGAN. *Improvements in the manufacture of photographic, jewellers', and other cases having wood or papier-mâché foundations, and where raised, regular, or irregular forms are required in such cases, and the machinery for carrying out such improvements, parts of which are applicable to other purposes where sawing or shaping is required.* Dated Jan. 22, 1857. (No. 191.)

This consists in a method of mitreing the angles in double mitres, so as either to retain the fibre of the material, or to form the two mitres at one operation; in cutting up the material with mitred edges without waste, by reversing the same in a suitable sawing machine; in the glueing into tubes and holding of the material so prepared in tubes suitably arranged, instead of tying or screwing such parts together; in the cutting of such tubes into rings of widths to form the top and bottom of cases, either together or separately by a combination of saws placed at the required distances; in a mode of preventing warping in wood cases by glueing two thicknesses of board together, the grain running transversely; in a combination of papier mâché or millboard tops and bottoms with wood sides, and the employment of marine glue; in a mode of rounding and forming the tops, bottoms, or interior fittings of cases by a machine for that purpose, also by cutters, or by circular planes; in the employment of glue with sawdust in hot moulds to form cases.

HICKMAN, G. H., and A. *An improvement in the method of manufacturing strip and hoop iron, used for making wrought iron tubes and other purposes.* Dated Jan. 22, 1857. (No. 195.)

The iron is rolled into a strip of the thickness or gauge desired, and then passed through a pair of rotating cutters whereby the edges are cut so that the strip or hoop is perfectly smooth on the edge.

LUEDEKE, E. *Improvements in obtaining power when steam, gas, or air is used.* Dated Jan. 22, 1857. (No. 196.)

This consists in the use of apparatus for regulating the supply of steam, gas, or air to an engine. The regulating apparatus is composed of a vessel or enlargement of the supply pipe in which it acts on a piston in a suitable cylinder. The piston rod has at all times a tendency to descend, and is by suitable apparatus put in communication with a valve in the supply pipe, so that when the pressure increases it will, by acting on the piston, also move the valve (and the damper of the flue of the steam boiler).

SADGROVE, F. *Improvements in the construction of window or other sashes or shutters and frames.* Dated Jan. 22, 1857. (No. 201.)

This consists in hollowing out or curving the pulley styles of window sash or shutter frames, in which the sashes, shutters, or sliding frames run, and in curving or convexing the styles of the sashes, shutters, or sliding frames to run therein, by which separate parting and stop beads, as well as the outside pieces now used to form the pulley styles of such sash frames are dispensed with. Also in similarly forming the soffit at the top and the sill at the bottom of the window, with a shutter frame, and the top and bottom rails of the sliding sash or shutter. Further in forming one or both sides of the pulley styles of the sash or shutter frame in two pieces. Lastly, in securing sashes, shutters, or sliding frames by a self-locking fastener, composed essentially of a spring bolt and catches, and so arranged that when the sash, shutter, or sliding frame is closed, the bolt is thrown into the catches and held secure.

VASSEROT, C. F. *A hydrostatic bellows.* (A communication.) Dated Jan. 23, 1857. (No. 205.)

This consists of a cylinder or hollow disc of metal, having inside thereof another cylinder dividing the bellows in two parts. Between the two cylinders is placed water. The inner cylinder is a reservoir for air, and through it passes a hollow axle supporting the apparatus. Motion is given to the apparatus by a to-and-fro movement with the hand, and a displacement of the water takes place. By this movement a vigorous aspiration is produced by atmospheric pressure on valves placed near the inside cylinder, on the side of the apparatus which resists the escape of the compressed air. The air compressed between the two cylinders or discs rushes with great force into the inner cylinder or reservoir, through valves, and this inner cylinder gives out a continuous supply of air.

VASSEROT, C. F. *An improved phosphoric fusee or tinder-box and lighter.* (A communication.) Dated Jan. 23, 1857. (No. 206.)

This consists of a box of metal having two compartments, one for the fusees, and the other containing a toothed wheel on an axle carrying a small handle for giving a rotary movement to the wheel. The top of the wheel compartment has a hole in its centre, to allow of the phosphoric part of the fusee entering and touching the wheel. The fusee being held in that position, a movement of the wheel ignites it.

PROVISIONAL PROTECTIONS.

Dated July 20, 1857.

1995. Alexander Whyte, warehouseman, of Glasgow. An improved mechanical arrangement for weaving.

Dated August 18, 1857.

2189. Hugh Pritchard Hughes, of Coetmor, near Llanllechid, Carnarvon. Improvements in the construction or arrangement of a rock-boring machine.

Dated August 21, 1857.

2225. Jules Dufau, of Paris, civil engineer. Improvements in regulating or controlling railway and light-house signalling.

Dated August 26, 1857.

2264. John Webb, of Bristol. An improved hopper.

Dated September 1, 1857.

2290. Thomas Bradford, of Salford, ironmonger. Certain improved apparatus for washing clothes or articles of wearing apparel, which apparatus is also applicable to churning.

2292. Henry Rawson, of Leicester. An improvement in machinery for combing wool and other fibres.

2294. Thomas Gray, of Richmond-street, Southwark, and George Joseph Gladstone, of Blackwall, shipwrights' surveyor. Improvements in apparatus for lowering and letting go ships' boats.

2295. Robinson Elliott, of South Shields, artist. Improvements in photography, by which the lensular defects of the present processes of taking photographic prints are avoided, and impressions are obtained of any size.

2296. Ephraim Taylor, of Blackburn, mechanic. Improvements in looms.

2298. Rudolph Sack, of Loeben, near Luetzen, Prussia, farmer. Improvements in the construction of ploughs.

Dated September 2, 1857.

2302. Alfred Vincent Newton, of Chancery-lane. Certain improvements in meters for gas and other fluids. A communication.

Dated September 3, 1857.

2304. George Frederick Parnell, of Hoxton, warehouseman. Improvements in the construction of hooks and eyes.

2306. Thomas Jackson, of Orchard-street, Portman-square, pianoforte-manufacturer. Improvements in the action of pianofortes.

2308. Perry G. Gardiner, of New York, mechanical engineer. New and useful improvements in the conical coiled steel railroad cut spring, and also of new and useful machinery for preparing, coiling, and converting steel plates or bars into such springs, and for testing and measuring the length of such springs.

Dated September 4, 1857.

2310. John Yuil Borland, of Manchester, machinist. Improvements in machinery for preparing, spinning, winding, and doubling fibrous materials.

2311. Louis Moreau, of Paris, gentleman. Improvements in apparatus for carbonizing peat, wood and other combustible matters.

2312. Prosper Bernard Godet, of Paris, gentleman. Improvements in stereoscopes.

2313. Tony Petitjean, of Hatton-garden, chemist. An improved method of obtaining aluminium and magnesium.

2314. Charles William Ramié, of Camberwell. Improvements in constructing the permanent ways of railways.

2315. Jacques Alexandre Ferrier, of Paris. Improvements in transparent photographic pictures, and their application to stereoscopes.

2316. James Robertson, of Kentish-town, gentleman. Improvements in furnaces, and in the consumption or prevention of smoke.

2317. William Edward Newton, of Chancery-lane. An improvement applicable to rolls for rolling iron or other metals. A communication.

2319. James Nuttall, of Silver-street, City, and Louis Stean, of Goswell-street. Improvements in fur gloves.

Dated September 5, 1857.

2320. Uriah Scott, of Camden-town, engineer. Improvements in machines for cleaning knives.

2321. Thomas Bent Wilkins, accountant clerk, of Birmingham, and Thomas Milward, metal-stamper, of Harborne, Stafford. Certain improvements in the combination of dies for stamping belt fastenings, and which said improvements are also applicable to the stamping of other such like articles or ornaments.

2322. Richard Johnson, of Blackburn, gentleman. Certain improvements in purifying and filtering water.

2323. John King, of Cannon-street, City. Improvements in the manufacture of boots and shoes, and in machinery for that purpose. A communication.

2324. William Edward Newton, of Chancery-lane. Improvements in clocks or timekeepers. A communication.

2325. William Edward Newton, of Chancery-lane. Improvements in the manufacture of a composition to be employed in the preparation of pigments. A communication.

2326. Henry Archer, of Gloucester-street, Pimlico, gentleman. Improvements in envelopes.

2327. Peter Armand Le Comte de Fontainemoreau, of London. An improved timekeeper-dial, showing the exact time in different countries. A communication.

Dated September 7, 1857.

2328. Spilsbury Butler, of Birmingham, manufacturer. A new or improved hearse.

2329. Peter Armand Le Comte de Fontainemoreau, of South-street, Finsbury. Improvements in doors. A communication.

2330. Andrew Walker, of Shotts, Lanark, moulder, and Thomas Walker, of the same place, pattern-maker. Improvements in the treatment or preparation of moulds for casting metals.

2331. Thomas Goodchild, of Guildford, Surrey, architect and surveyor. Improvements in stoves and fireplaces.

2332. William Lewis and William Henry Lewis, of New York. Improvements in plate-holders or frames for photographic cameras.

2333. William Sellers, of Philadelphia, U. S. A. Improvements in boring or turning mills for operating in metals or stone.

2335. Constant Jouffroy Duméry, of Paris, civil engineer. Improvements in smoke-preventing apparatus.

2337. Louis Alexis Imbert, of Trevilly, near Avallon, France. An iron straight-edge holder, designed for strengthening walls, edges, or mouldings.

Dated September 8, 1857.

2339. George John Parson, of Adelphi-terrace Strand, gentleman, and Thomas Pilgrim, engineer, of Bow. Improvements in the mode of generating steam in the boilers of steam engines, and in raising the temperature of steam for other uses.

2341. Benjamin Sharpe, of Hanwell-park. Improvements in electric telegraph cables, and in the apparatus used for paying-out such cables.

2343. James M. Miller, of Washington, U. S. A. Surface condenser, applicable to steam engines and other purposes.

2345. William Howard, of Great Queen-street,

Lincoln's-inn-fields, type-founder. Improved apparatus for supplying air, medicated or pure, to persons in confined apartments, and other places requiring ventilation.

Dated September 9, 1857.

2347. Louis Letournel, of Paris, gentleman. An apparatus for weighing ships' anchors.

2349. Leon Louis Honoré Bertou, of Rue d'Hauteville, Paris, stationer. Improvements in the manufacture or production of ornamental wrappers or packings for fabrics or other goods.

2351. James Eastwood, of Derby, engineer, and Samuel Lloyd, Jun., engineer, of Wednesbury, Staffordshire. Improvements in machinery for shearing iron and other metals.

Dated September 10, 1857.

2355. John Honeyman, Jun., of Glasgow, architect. Improvements in generating steam.

2357. William Jamieson, of Ashton-under-Lyne, machinist. Certain improvements in looms for weaving figured fabrics.

2359. Richard Houchin, of Bridport-place, Hoxton, engineer. An improved press for punching, stamping, and embossing, or otherwise, for cutting out paper, leather, or other materials, and for fixing and closing eyelets.

2361. John Dearman Dunnicliff, of Nottingham. Improvements in dividing and measuring breadths of lace and other fabrics.

2363. William Crofts, of Lenton-terrace, Nottingham. Improvements in the manufacture of various weavings in bobbin net, or twist lace machinery.

Dated September 11, 1857.

2365. Marc Antoine François Mennons, of Paris. An improved smoke-condensing apparatus. A communication.

2367. James Mills, of Manchester, machinist. Certain improvements in the manufacture of keys, tapered pins, split pins, and other similar articles employed in the construction of machinery.

2369. Aristide Michel Servan, of Paris, civil engineer. Improvements in the cementation of iron combined with the manufacture of coke.

2371. Charles Lungley, of Deptford-green Dockyard, shipbuilder. Improved apparatus for directing, signalling, and indicating on board ships or vessels, or other places.

Dated September 12, 1857.

2373. Nicolas Gustave Imbert de Laphalèque, gentleman, of Paris. Improvements in violins and other stringed musical instruments of a similar nature.

2375. John Butler and Joseph Pitts, of Stanningley, York, engineers. An improvement in fastening tyres on wheels for railway carriages.

2377. Isidore Charles Cloët, of Ghent, Belgium. Machinery or apparatus for treating and dressing rice.

Dated September 14, 1857.

2381. Theophilus Marsh, of Pond's Works, Sheffield, manufacturer. An improved piston. A communication.

2383. Alexander Gray, of Glasgow, manager. Improvements in the picking motion of power looms.

2385. John Sleddon, machinist, and Joseph Marsland, engineer, both of Oldham. Improvements in preventing incrustation in steam boilers.

Dated September 15, 1857.

2387. Richard Shiers, Jun., of Oldham, manufacturer. Improvements in the manufacture of velvets.

2389. John Walmsley and Thomas Howard, of Accrington. Improvements in machinery or apparatus for warping, sizing or dressing and winding on yarns or threads.

2391. Gerd Jacob Bensen, of Christian-street, St. George's-in-the-East, sugar-refiner. An improvement in drying sugar.

2393. Adrien Jules Alexis Dumoulin, of Paris, civil engineer. Improvements in heating apparatus.

Dated September 16, 1857.

2395. Thomas Sidebottom Adshead, of Staleybridge, Chester, cotton-spinner, and John Platt, of Oldham, mechanical engineer. Certain improvements in machinery for carding cotton and other fibrous materials.

2397. Richard Wicks, of Phœnix-street, Somerstown, builder. Improvements in furnaces.

2399. Abram Seward and Charles Seward, of Lancaster, manufacturers. An improved boiler for heating and keeping up circulation in water.

2401. Alphonse René Le Mire de Normandy, of Judd-street, Brunswick-square, analytical chemist, and Edward Thornhill Simpson, of the Calder Soap Works, Wakefield. Improvements in the manufacture of soap.

2403. William Middleton, Jun., ironfounder, and Thomas Tertius Chellingworth, civil engineer, both of Birmingham. Certain improvements in adjusting the sliding parts of chandeliers and gas pendants.

2405. Robert Garrard, of Lemon-street, Southwark, hat-manufacturer. Improvements in the manufacture of japanned straw hats.

2407. Emile Alcan, of Fore-street, merchant. An improved process for refining paraffine. A communication.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

2410. John Smith Barden, Aaron Watkins Rockwood, Holmes Hinkley, and Daniel Franklin Child, all of the United States of America. Certain improvements in engines for hydraulic or various other useful purposes. A communication. Dated September 17, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," September* 29, 1857.)

1359. W. Sissons and P. White. Improvements in steam pile driving machinery.

1391. N. Ogle. An improved method of propelling and ventilating ships.

1398. J. Apperly and W. Clissold. An improvement in carding engines and in condensers applicable thereto.

1400. C. F. Vasserot. A typographical numbering apparatus. A communication.

1402. T. W. Roys. Improvements applicable to explosive shells.

1406. J. Hope. An improved screw nut and ratchet brace for working the same.

1410. M. B. Rowland. Improvements in soap and detergent preparations or compounds.

1412. C. W. Harrison. Improvements in obtaining light by electricity.

1414. A. Foulkes. Improvements in sewing or pointing gloves, and in machinery for such purposes.

1415. P. Ingwersen. A certain remedy to prevent and dissolve the deposits in boilers and steam generators. A communication.

1417. H. Keogh and F. A. Keogh. Lighting the public gas-lamps in the cities and towns of Great Britain and Ireland by electricity, and for turning off and on the gas to same simultaneously.

1421. E. Aldis. Improvements in cramps for flooring and other purposes.

1422. J. Harrisson. Improvements in railway signals.

1423. J. Abbot, jun., R. H. Thomas, J. Young, and J. E. Hunt. Improved machinery for blooming iron.

1424. J. Jakens. Improvements applicable to printing and dyeing woven fabrics and fibrous materials.

1433. W. Blacklidge, Jun., and G. Read. Certain improvements in the construction of churns, which said improvements are also applicable to other agitating or stirring apparatus.

1434. W. Todd. Certain improvements in the treatment of yarns or threads, and in the apparatus for performing the same.

1449. J. R. Engledue and W. Cullis. Improvements in ventilators for ships' cabins, apartments, and places.

1451. P. Effertz. Improvements in machinery for making bricks.

1453. W. Carron. A new or improved nail, spike, or bolt, and machinery for manufacturing the same.

1458. T. H. Roberts. Machinery or apparatus for cleaning the inside of casks and puncheons.

1461. J. Phillips. Improved apparatus for supporting and propelling the human body in water.

1464. W. Robertson. Improvements in pistons and in apparatus connected therewith.

1469. N. C. Szerelmey. Improvements in preparing combinations of materials for coating wooden and iron ships or vessels.

1478. W. S. Underhill. Improvements in wringing-machines.

1497. J. L. C. Négrier. Improvements in the manufacture of boots, shoes, harness, and other articles.

1499. R. Cresswell. A new article to be called "Typha Velvet," suitable for carpets, furniture hangings, wearing apparel, and other useful purposes.

1500. R. Cresswell. Improvements in grease or lubricating boxes for axles and other rotary parts of machinery.

1502. R. A. Brooman. Improvements in distilling, and in apparatuses employed therein. A communication.

1506. T. Grahame. Improvements in inland navigation.

1507. T. T. Jopling. Improvements in water-gauges of steam boilers.

1543. G. Tingle. An improvement or improvements in machinery for the manufacture of articles from clay and other plastic substances.

1559. E. Roy. Improvements in the construction of railway vehicles for the special purpose of allowing them to run freely on short curved lines.

1562. W. Jones. Improvements in heating and compressing artificial fuel.

1567. J. Jobson. Improvements in oil-cans or feeders.

1587. W. E. Newton. Improvements in the manufacture of paper, papier-mâché, cardboard, and other similar articles. A communication.

1630. A. Dunn. An improvement in preparing and packing tooth-powder.

1642. J. M. Paule. Improved means for ventilating coal and other mines.

1673. A. V. Newton. Improved means of registering the performance of railway trains. A communication.

1697. H. Brinsmead. Improvements in machinery for dressing corn.

1896. J. J. H. Brianchon. Improvements in colouring and ornamenting glass, porcelain, earthenware, and other ceramic substances.

1987. S. Ramsden. Improvements in the construction and fixing of window-sashes.

2035. F. Oetzmann and T. L. Plumb. Improvements in upright pianoforte actions.

2078. H. Bauerrichter and G. Gottgetreu. Improvements in the arrangement or adaptation of stereoscopic apparatus, and in boxes or cases for containing the same.

2292. H. Rawson. An improvement in machinery for combing wool and other fibres.

2298. R. Sack. Improvements in the construction of ploughs.

2348. J. M. Miller. Surface condenser, applicable to steam engines and other purposes.

2361. J. D. Dunnicliff. Improvements in dividing and measuring breadths of lace and other fabrics.

2393. A. J. A. Dumoulin. Improvements in heating apparatus.

2410. J. S. Barden, A. W. Rockwood, H. Hinkley, and D. F. Child. Certain improvements in engines for hydraulic or various other useful purposes. A communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2060. Robert McConnel.
2066. Louis Cornides.
2067. Joseph Boulton.
2104. George Fergusson Wilson and George Payne.
2114. John Penn.
2124. Christopher Nickels and James Hobson.
2143. George Collier.
2180. Edward John Seville.
2210. Etienne Bernot.

LIST OF SEALED PATENTS.

Sealed September 23, 1857.

744. Charles Askew, John Askew, and Henry Myers.
811. John Sherar.
815. Thomas Mosdell Smith and Cornelius Burke.
826. Thomas Lawes.
827. William Henry Collins.
828. Thomas Lawes.
841. Joseph William Wilson.
845. William Thomas Clark.
849. Augustus Frederick Butler.
852. James Morris.
873. Arthur Neild and Nathaniel Buckley Sutcliffe.
875. David Jack.
891. John Graham.
901. Robert Adam.
906. Henry Smith.
909. John Oliver.
916. Duncan Morrison and Samuel Lilley.
917. Edwin Maw.
933. Félix Marie Baudouin.
951. John Henry Johnson.
987. James Bird Sparke and Alfred Sparke.
990. Charles Tilston Bright.
993. Alfred Vincent Newton.
1004. Charles Frederick Bielefeld.
1039. William Edward Newton.
1052. Thomas Harrison.
1064. Louis Barnett.
1151. George Wright.
1283. William Edward Newton.
1511. William Edward Newton.
1565. George Deeley.
1669. John Henry Johnson.
1682. John Fowler, Jun., and William Worby.
1684. John Fowler, Jun., Robert Burton, and Thomas Clarke.
1878. Richard John Badge.
1915. William Johnson.
1930. John Chanter and David Annan.

1955. James Webster.
1983. Thomas Foxall Griffiths.
1993. William Edward Newton.
2007. Samuel Butler.
2023. Jean Jacques Bouvert and François Isidore Jean Pascal.

Sealed September 25, 1857.

831. John Hewett.
834. Reuben Sims.
855. Emil von Löwenstein.
861. Charles Martin.
864. David Thomson.
866. Ferdinand Jossa.
869. Hippolyte Benigne Girard.
870. Louis Étienne Deplanque.
886. George Hamilton.
897. Benjamin Horatio Paul.
935. John Bourne.
957. Thomas Melling.
981. Frederick Piercy and Samuel Flagg.
1006. George Edward Taylor.
1012. John Coope Haddan.
1013. John Coope Haddan.
1028. Thomas Nathaniel Pengelly and George Porter.
1047. John Ramsbottom.
1049. Peter Wicks and Thomas Goulston Ghislin.
1060. William Edward Newton.
1065. Alfred Vincent Newton.

Sealed September 29, 1857.

904. Robert Wardell.
918. Robert Otway.
920. Richard Archibald Brooman.
922. William Hardman and James Dugdale.
928. John Smith.
932. Thomas Whitehead.
942. Charles Renshaw.
944. James Milnes and Frederick William Mowbray.
948. John Henry Johnson.
954. William Perks, jun.
964. John Slack.
974. George Pearson and Edward Jessop.
1046. Patrick McFarlane.
1078. Thomas Layzell Scowen.
1080. James Warburton.
1082. James Warburton.
1084. James Warburton.
1087. George Schaub.
1088. Edward Oldfield.
1090. Jean Marie Leonidas Cailland.
1102. Charles Richard Barnes.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

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Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

McCONNELL'S STEAM RAILWAY BREAKS.

Fig. 2.

Fig. 3.

McCONNELL'S STEAM RAILWAY BREAKS.

MR. J. E. McCONNELL, the well-known engineer, has introduced and patented an improved construction of and mode of working railway breaks, employing steam power for the purpose, in order that an effective break action may be obtained simultaneously upon the periphery of the wheel and the surface of the rail.

The annexed engravings represent the improved breaks. Fig. 1 is a side elevation of the fire-box end of a locomotive engine fitted with one of them, the break-actuating cylinder being horizontal; fig. 2 is a similar view of a portion of a locomotive engine, having the break-actuating cylinder in a vertical position; and fig. 3 is a back end elevation of a locomotive engine, showing the vertical and horizontal arrangement of the break-actuating cylinders. A is the break-actuating cylinder, which in fig. 1 is placed horizontally, and is bolted to the lower portion of the side of the fire box, a flange or bearing plate, B (figs. 1 and 3), being cast on the side of the cylinder for that purpose. Inside this cylinder works the piston, C, which is fitted or formed on the piston rod, D, such rod passing through stuffing boxes, E E, in both ends of the cylinder. To each outer extremity of the piston rod is jointed a link, F, which serves to connect it to the centres, G G, of the knee or toggle joint levers, H H. The upper ends of these levers work on fixed stud centres, I, in the bearing plate, B, whilst their lower extremities are jointed at J J, to the skid break, K. This break may be composed of metal or of wood, or other suitable material, and when not in action, as shown, it is held suspended by the levers, H, about two inches immediately above the rail. The back end of this skid break is curved, as shown at K′, for the purpose of fitting the periphery of the trailing or other wheel of the engine; L is a radius bar, which is slotted at the end attached to the break, and works on a fixed centre beneath the axle box at M, the object of this radius bar being to regulate the skid or break when it is being lowered on to the rail, and to hold it in its proper position to the periphery of the trailing wheel. The steam pipes, N N′, for admitting steam to either end of the cylinder, A, are shown broken away or disconnected from the cylinder. They both open into a small valve chest, O, on the the top of the boiler, or in any other convenient situation. An ordinary slide or other suitable valve is employed for admitting the steam (which enters from the boiler by the pipe, P, into the valve chest) into one or other of the pipes, N N′, according as the break is required to be put on or taken off, the two pipes, N N′, opening respectively into opposite ends of the cylinder. The slide in the valve chest, O, is actuated by the sliding rod, Q, which is attached to one end of the curved lever, R, working on a fixed centre attached to the top of the boiler, the opposite end of this lever being inserted in a slot in the valve spindle, S. As it is desirable that the piston rods in the cylinders, A, should be directly over the rails, it will be requisite in some cases, for example, where the cylinders are of a large diameter, or when the engine is wide, to form or connect the piston rods eccentrically upon or to the pistons, as shown in fig. 3, or to use two cylinders and separate pistons for each joint of break, as may be considered desirable.

Breaks and actuating cylinders and levers, all of similar construction, are fitted on to each side of the engine tender or some of the carriages, each pair of breaks being coupled by transverse tie rods, T, as shown in fig. 3. One valve may be used to supply steam to the actuating cylinders throughout the trains. When it is desired to put on the breaks, the engineer brings the slide in the valve chest, O, into such a position as to admit the steam in front of the piston, C, whereupon they will be caused to travel to the back or opposite end of their cylinders, and will thereby tend to straighten the toggle joint, H. This will have the effect of lowering and forcibly pressing the breaks, K, upon the rails. The friction thus produced, in conjunction with the action of the radius bar, L, and the motion of the train, will cause the back portion of the breaks at K to be pressed against the peripheries of the wheels immediately behind them, but still not to such an extent as to prevent them rotating until the speed of the train has been considerably reduced. The main object of carrying up the end of the skids is to prevent the wheels from running upon or mounting the skids. By another motion of the valve at O, the steam may be made to enter the opposite ends of the cylinders, A, and the breaks will be raised from the rails again, and the skidding action will of course cease.

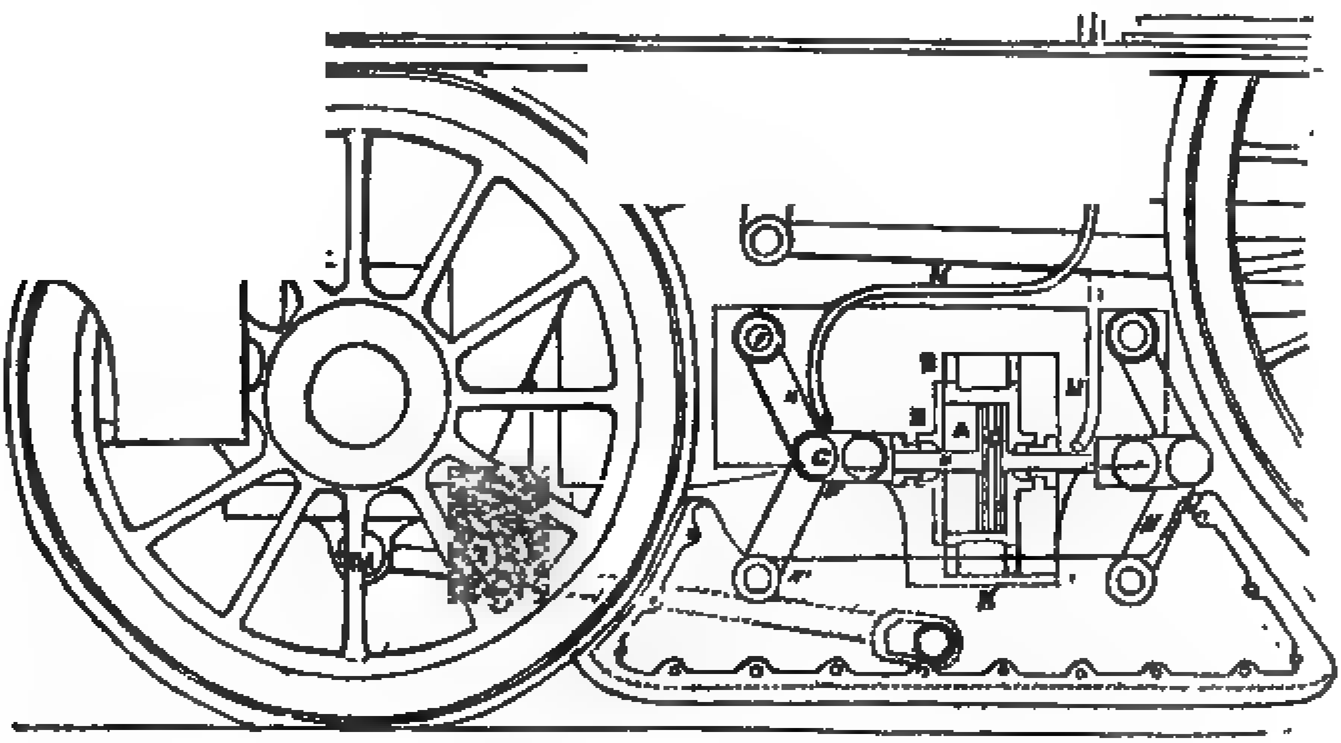
In fig. 2 is represented the same construction of break, but instead of placing the actuating cylinder, A, horizontally, it is placed vertically, and shown bolted to the side framing of the engine, in place of to the fire box. In this arrangement the piston rod need not pass through with ends of the cylinder, but its protruding end is guided vertically by the guiding bracket, D′. A cross head, H′, is fitted to the piston rod, and to this cross head are jointed the links, H H, which are jointed at their lower ends to the skid, K. One or other of these links is slotted, as shown at I, for the purpose of allowing for the diminution of the distance between the stud at I in the skid, and the upper end of the link, when the latter assumes a vertical position by the longitudinal motion of the skid towards the

peripheries of the wheels. Immediately behind the skid a valve of similar arrangement to that already described may be used, the putting on or taking off of the break depending entirely upon the side of the piston to which the steam is admitted.

Fig. 3 represents merely in end view the horizontal and vertical arrangements of cylinders before described.

Mr. McConnell observes, that he does not restrict himself to the use of one cylinder to each skid or break, as in some cases it may be found desirable to employ a pair of cylinders, that is, one for each knee or toggle joint in the horizontal cylinder arrangement; or two vertical cylinders may be used in the second modification described, when it would be inconvenient to have one cylinder of large diameter; and although he particularly refers to steam as the agent for actuating the break mechanism, he says it is obvious that fluid or compressed air might be used with the same results.

Fig. 1.



FURTHER CONSIDERATIONS ON HEAT AND OTHER IMPONDERABLES.

BY HORATIO PRATER, ESQ.

(*Concluded from page* 176.)

In 1824, Carnot, in reference to the steam engine, considered there was a *transfer* of heat, but *without any ultimate loss;* first from the furnace to the water in the boiler, by which the motion of the piston was produced, and then to the condensers; he, as I *conceive*, justly (though I will not venture to be certain on this point) considering heat to be *indestructible*. But the new theory in considering it *actually* "converted" into motion in the steam engine is obliged to admit the motion of the piston cannot be continued without REMOVING some of the heat imparted. This is done by the condenser, which causes the expanded water to contract, and the piston falls. But surely this removing of heat ought to diminish, rather than increase the amount of motion on the "conversion" theory.*

It is argued that it seems indifferent, whether in the above case we view the heat as transferred or actually "converted." All I can say, then, is, that as the former explanation seems the more simple, and unembarrassed with how to explain that we are obliged to REMOVE some heat to get more motion, I prefer Carnot's view, at the same time admitting, that when the "conversion"

* Prof. Clausius has given a new and ingenious diagram of the steam engine, to show the way the motion is produced, and has thus made it more intelligibly "*a circular process*," as he calls it. (Poggendorff's *Annalen*, vol. xcvii. Trans.) But I do not see that this affects the above reasoning.

theory is supported by stronger arguments I shall be ready to embrace it. I do already embrace it to *a limited* extent, as my Essay (*Mechanics' Magazine*, Sept. 1856) shows;* but I deny that we have proof of the truth of that wholesale attempt at generalization now adopted by too many.

The point is sought further to be illustrated by the "conversion" theory, by saying that when air is heated it expands and produces *mechanical motion*, but if its expansion be prevented, it produces extra heat. But in opposition to this plausible view, it may be said that air in its expanded state has less mechanical power of motion; heat has been added to it, and, at all events, *after receiving a certain quantity* of this, so far from its seeming to be "converted" into motion, it seems the contrary. I admit, however, that *a certain amount* of heat does increase the mechanical motion, and so far their reasoning holds. But they forget that heat *is*, in fact, always mechanical motion, as the experiment of heating water in a perfectly closed metal vessel, proves by its certain rupture; but the *burning sensation* it occasions (with other reasons) induce me to believe it to be *also* something more; and this the "conversion" advocates deny, and must indeed do so, for they admit heat to be the motion only of atoms of *matter; and mere mechanical motion, of atoms or powders*, cannot be made to cause the peculiar pain of great heat. Here then seems an *experimentum crucis* against them.

"A certain quantity of heat *is produced* by a certain quantity of mechanical motion,"† and I have just said that mechanical motion is also produced by—in fact is an essential property of heat—so it is also of electricity, *running in a certain direction*, as the experiment of raising heavy weights of iron by it shows. But heat is rather *expansive* motion, and acts upon or between *atoms* as such, while electricity, converted into magnetism, acts on and will raise masses. But as heat will do the same when in certain circumstances (as boiler explosions show), this distinction seems more apparent than real.

The cause of electricity seems to be a disturbance in the natural heat of bodies; for whether produced by friction or by chemical action, the generation of heat accompanies or precedes the electricity. This theory will also probably apply to the product of that *very* feeble quantity of electricity which has very lately been shown to be produced by mere *approximation only* of different metallic plates; for such approximation probably slightly alters the quantity of heat natural to each of them.*

The "conversion" theory has been most plausibly applied to heat and mechanical motion; not with so much talent as regards electricity, light, and magnetism. Electricity, for instance, is said "*directly to produce*" magnetism, light, and heat; and so of magnetism in regard to electricity, light, and heat. But "to produce" is not always to "convert;" for heat is produced by all very rapid mechanical motion, whether of masses, as in friction, or of atoms, as in chemical affinity, and also by *rapid motion*† of electricity (perhaps also light and magnetism) through masses or atoms; and, as Clausius says, in proportion as resistance to its passage is

* Since that was written, I observe (*Phil. Mag.*, Nov., 1856) that Prof. W. Thomson thinks he has proved "that an electric current in an unequally heated conductor, if its *nominal direction* be from hot to cold through the metal, causes a *cooling (!)* effect in iron, and a heating effect in copper." Should this extraordinary conclusion, as the editors justly term it, be confirmed, I should rather infer that electricity, in *certain circumstances*, can "convert" heat into itself, and thus produce cold, than that it can *annihilate* heat, and by this means produce the "cooling effect;" for though I conceive, contrary to the "conservation" theory, this force can be generated, I do not as yet see sufficient evidence that it can be annihilated.

† This quotation, again, is plausible and true, considered merely as a matter of fact; but the word "produced" must in reality mean generated, and yet our author denies the generation theory, and supports "conversion" only. But *in reality* there is not such a great difference between the two; for generation has "conversion" for its beginning (food, for instance, into living organic matter), and this conversion is called generation when the power *seems* to *extend further*, and to reproduce itself *as a whole* (as in life), or simply to *extend*, as in flame. Thus nutrition is a generative power *confined to parts*; while generation is the same as regards *the whole*, or the identity. In all animal and vegetable life, generation and nutrition exist always; nutrition exists in flame, and consequently, from analogy with life (and other reasons), I infer that the generative power also there exists, as this seems but a PERFECTION of the nutritive power.

Returning to the quotation, our author again, in his zeal for heat being "produced" by motion, does not attempt to account for that *something else* in heat which causes pain, and that too when the heat exists even *in masses of matter*.

* "As no deviation of the galvanometer is produced by putting in contact two different metals, of which the entire mass is of the same temperature, whether that temperature be low or medium;" "but, as it always is, when unequal quantities of heat are furnished or taken away from either of them" (Donovan, *Trans. Royal I. Academy*, 1856, part. I.), it seems, I think, pretty clear that when electricity is produced by contact *without fluids, it is generated by the circulation or vibration of heat through them*. Thermo-electricity proves the same. It has also been still more lately shown, by numerous experiments (*Phil. Mag.*, Jan., 1857), that currents are produced by platinum *heated unequally*, and that the liquid "only conducts."

† As there is great *expansion* of matter, when light and heat are produced by inflaming gunpowder, the theory of condensation producing heat does not seem so satisfactory as the above, though doubtless condensation may sometimes assist or *increase* the effect.

greater. This theory well seems to account for facts quite independent of "conversion." This term would seem indeed not inaptly used in respect to electricity becoming magnetism by circulating in *a particular direction*. But as such is the case, and as magnetism, *like electricity*, always exhibits a polar state, no "conversion" seems needed, for electricity *is* magnetism *in reality*.*

In certain circumstances heat seems sometimes "converted" into light; but further experiments are wanting on this point. A curious observation which has been made with regard to light is, that solids as transparent bodies that conduct light well, conduct electricity (often also heat) very badly. Diamond is a perfect non-conductor of electricity; but when *opaque*, as in charcoal, is one of the best known conductors. So the gases transmit light, but conduct electricity badly, or not at all.

The leaders of the present theory assume that force (like matter) can neither be created nor annihilated; but this is too sweeping a generalization. *Probably* the physical forces, heat, light, electricity, and magnetism cannot be annihilated; but mechanical motion *seems* certainly to cease, and I do not think it has yet been *proved* to be converted into heat. Nobody will deny that vital *force*, strictly so called, is annihilated; for it certainly ceases to be able to make the *visible atoms* of animal and vegetable bodies move after a certain period, and this is all the *mere physical* philosopher has to do with the nature of that force.

Again as to the "non-creation of force"; we might appeal to the same vital power to show that force *is* sometimes created by nature. And if the advocates of "conversion" say we mean our theory only to apply to heat, &c., &c., why I have already stated that the IMMENSE amount of heat produced in some cases of chemical action seem to show there must sometimes be a generation of that force in Nature. I have just as much reason—indeed far more—to make this assertion as others have to say it is "CONVERTED" from mechanical motion, &c.; for by generation I only mean an *obvious* fact, viz., its *great increase*, and pretend not to decide whether this is produced by the heat of burning bodies *attracting* heat *from the great store of this existing in the earth*, or whether heat, like life, has a real power of reproducing itself (*not out of nothing*) but out of matter, for more experiments are wanting on this point. As Sir H. Davy seems to have produced enough heat by making two pieces of ice rub against each other in vacuo to melt the ice (for details on this and *another* experiment see Thomson *On Heat* &c., p. 284, Baillière), I must believe that my theory of an *actual generation* of heat is better supported *even at present* by facts than the "conversion" theory. And if, even in the above case of ice (and the metal plate) this theory be adopted, by saying the *mechanical motion* used to melt the ice was "converted" into heat, then I shall suggest the experiment of trying to burn iron wire in oxygen, or to inflame powdered antimony by chlorine in an *atmosphere surrounded by snow or ice*. If the metals burn (as I have little doubt they would) then surely philosophers will rather attribute such effects to the generation instead of to the "conversion" of heat, and learn what they at present have not properly learned, viz., to think for themselves, and not to deny obvious facts, because in opposition to prevalent opinions, or prejudices, by which means, the progress of real science has been and is, much retarded. I shall now go in imagination further than the above experiments, or any other probably that can be made, and assert that supposing ALL the heat existing in the oxygen and iron wire were removed, then indeed that no combustion could be expected. But why not? Simply for this reason (as I have stated in print last year), viz., that the heat ALWAYS EXISTING in matter is probably the real cause of its chemical affinities, since, if the *cold were great enough*, all water would be ice, and probably even oxygen a fluid or solid, as we know that carbonic acid gas is at a certain temperature. As we see that water differs much from ice, and vapour from either, and that heat, even as we now know, *alters* affinity often *according to temperature*, so if oxygen could be made a solid, its action on iron would probably cease, *from its usual affinities being altered*, and thus quite independent of its change of physical state.

But this would be a case (supposing it possible) *where no heat at all existed*, and consequently as there was no heat to *begin*

* It is curious that our authors, when alluding to the production of electricity by the friction of non-conductors of electricity, say scarcely a word of the simultaneous production of heat; and one of them, that just alludes to it, asserts, and justly, he does not know how the electricity is produced; for seeing heat and electricity both produced at the same time by the mechanical motion, he only ventures to assert that mechanical motion is changed into heat. Then why does he not plainly say the electricity must either be generated, or, so to call it, *excited* and *made manifest* by friction; for anything like "conversion" is little probable, as *heat is* ALSO produced. Here, then, is a case of generation, or non-generation, to DECIDE BY EXPERIMENT; which, for the present, I shall add to my list of forces generated, until the contrary is proved experimentally.

combustion we could not expect there to be any increase or generation of heat, for this would be asserting such generation *out of nothing*. As even life in the higher order of beings must have *its own like* to spring from, so I should not expect to see heat arise where there was *no heat at all*. Perhaps even this modified view will not be accepted by those so sanguine about the indestructibility of force; but the "conservation" of this is best provided for by such theory, as it is difficult to PROVE that even heat itself, in some cases, is not actually destroyed.

We have seen in the above pages how chemical has been thought to be "converted" into electrical force, and *vice versâ;* but on the above view we perceive how heat (*existing as an essential principle of matter*) is probably the cause of chemical affinity.

As one of the principal objects of this essay is to support and extend my views of heat being a sympathetic and generative power,* with some illustrations of which in physical science I opened my essay "On Heat and Light" last year (*Mech. Mag.*, Sept., 1856), and to which I again refer the thoughtful reader, I shall here *briefly* state (hereafter referring probably more at length to the subject) that such views of the intimate nature of heat seem supported by reference to the nature of gravitation; for how can this be increased or diminished by *mere distance*, as astronomers tell us, unless this force also had like heat, a generative power? As Newton has not yet, I believe, been proved to be wrong, I shall humbly follow his views on this point, and consider that in having brought forward another *mere physical* power which has a similar generative property, that I have thereby increased, *by analogy*, the probability that heat has such power. Until the advocates of new views on this point can show *experimentally* that gravitation by *mere change of distance* (!) is "converted" into electricity or other force (as they seem to suppose), I see no reason to adopt their views, as they seem equally difficult to understand, and *less strongly supported by analogy;* and as the case *now* (at all events) stands, the example of gravitation seems a pure instance of the absolute generation of force. Beccaria (*Dei Delitti*) likened gravitation to love, as increasing by proximity; and nobody doubts the generative power existing in the latter, nor that such power is much increased, nay almost produced, by such proximity or contact. I state FACTS; I pretend not to explain the HOW!

After having written the above, I find in a paper just published (*Phil. Mag.*, July, 1857) that Prof. Tyndall has given some experiments on the sounds produced by hydrogen gas burning in tubes, which sounds seem to be influenced sympathetically by certain modulations in the voice, and he hence speaks of the "singing flame." These experiments seem to unite the phenomena of sound and flame (heat) more strictly, and so to confirm the opinion now for the first time broached in these different essays on sound and heat, viz., that in each of them, though apparently so different phenomena, a peculiar principle, which may be called sympathy, exists. This is probably *an inherent quality* of the *ether* supposed to cause them, and which also, according to Newton's view, is the cause also of gravitation. Hence we should expect to see this sympathetic principle very strongly developed in this last force; and so it is in an almost miraculous way, increasing so strongly by proximity. Electricity and magnetism do the same; so that it seems not improbable that gravitation is some *very peculiar modification* of these forces, and thus that probably *all* the physical forces are modifications of the universal ether.

If it be thought I have insisted too much on the *sensation of pain*, as showing heat to be a peculiar imponderable, I beg to say that ozone was first discovered by its smell, and that *even now* some persons doubt whether the so-called chemical test of this ought to be always relied on, as *other* vapours in the air seem to cause a like reaction with ozone (See *Comptes Rendus*, and *Phil. Mag.*, May, 1856). Nobody doubts that musk, &c., exist in the air when he can detect them by the sense of smell; but where are the *chemical* tests for these vegetable odours? Consequently, although it may be called unphilosophical to trust to the senses in scientific analysis, we see that we

* I, in common with the majority, have elsewhere also denied, or rather hitherto not perceived, its *polarity*. But I begin to have my doubts on this point, from the following reflection, which will tend to make us believe in a certain amount of such property, though to a less marked extent than in electricity. "Heat," says Prof. Clausius, justly, "can never pass from a *colder* to a warmer body without some other change, connected therewith, occurring at the same time." It is a fact, then, that heat always tends to pass *from hot* to colder bodies. But by "colder bodies" I only mean bodies, of course, with less heat: for *some* heat must exist probably everywhere. This, then, is *a sort* of + and − state, *though not so obviously so* as the electric. But it is also a *sympathetic* state, *in which opposites necessarily tend to become the same.*

I observe that Prof. Tyndall now concludes, from very numerous experiments, that the diamagnetic force is polar. (*Phil. Mag.*, Sept., 1856.) So that if we admit this state in heat, *all* the imponderables known will contain, as an essential property, the *sympathetic principle;* for though I inferred the existence of this in heat from *other* properties, yet a polar state is still, perhaps, the strongest proof of this principle.

are sometimes obliged to do so, and more, viz., that they are sometimes *our best tests*.

Again, I might have added the fact of SPONTANEOUS COMBUSTION (oil falling on dry sawdust in a summer's sun has very lately—*Daily News*, July, 1857—set premises on fire) in favour of my theory of the reproductive powers of heat. And more, as evidence that, in such a case, this extra heat cannot have been drawn from the *large quantity of heat always existing in the earth*—a point alluded to in my essay, and then left as doubtful. I say it *cannot*, on account of Professor Clausius's observation, viz., that heat always passes *from* the hotter to the colder body. Now the hotter body, in the above case, was certainly the sawdust; therefore the tendency of heat was as certainly to flow *from* this, instead of *to* it. Therefore, as this sawdust *derived no heat from the central heat of the earth*, it follows, of course, that such extra heat was on the spot, there and then, actually REPRODUCED.

I might add *other* cases of spontaneous combustion to the above; but this will be sufficient, as the same mode of reasoning will apply to all others.

In the foregoing I have also considered the TOTAL abstraction of heat as a *possible* case. Judging from the arctic circle, such *partial* abstraction is no doubt possible; but, *taken as a whole*, the existence of matter without pretty much the same quantity of heat as we see now existing seems scarcely possible, since we know there is always much central heat, which exists almost as an ESSENTIAL PROPERTY of matter itself. The *unequal* presence of heat is, therefore, all we seem justified in supposing as possible, while matter itself remains of the composition we find it, since it will necessarily retain a power of REPRODUCING heat (*when particular elements meet*), even should the great central heat *in process of time* grow far less than it at present seems to be. The existence of heat, then, dates from the time of the very existence of matter—at least, of the composition we now find it.

PLANETARY DISCOVERIES.—M. Goldschmidt, of Paris, who has recently discovered several small planets, a few nights since surpassed all former astronomical observers, by discovering two planets in the same evening, and that with an instrument of very moderate power. This success has certainly never been paralleled.

MOY'S MODE OF WORKING STEAM ENGINES.*

BY T. MOY.

I have obtained provisional protection for certain improvements in the mode of working steam engines. The boiler is composed of a continuous tube which may be arranged in any efficient mode. The heated water circulates through the boiler, jacket, and valve box of the cylinder; the upper and hottest end of the tube communicates with the upper part of the jacket, and the lower end of the tube leads to the lower part of the jacket. By the circulation of the heated water the cylinder is always kept at the same heat as the boiler. An open communication is maintained in any convenient place or places between the jacket and valve box.

If a slide valve is used it must have three cavities. The upper and lower cavities are for receiving and delivering the necessary quantity of water from the valve box to the steam passage. The middle cavity is for the eduction. Before the water cavity of the valve arrives with its supply of water at the steam port, its communication with the valve box is cut off, and this allowance of water turns into steam and works the piston. The throttle valve and regulator must be on the eduction.

In my specification I shall describe various useful modifications and additions, which I need not occupy your time in describing, my object now being to give you a general idea of the principle without troubling you with the details; but I may mention, that I have a plan for controlling the number of inches of water supplied to the cylinder at each stroke without stopping the engine. The engine always works expansively.

Suppose an engine, the internal capacity of whose cylinder is equal to three cubic feet, to be supplied by the valve with three cubic inches of water at 500° Fahr. As soon as this is at liberty to enter the cylinder it commences to turn into steam, which will drive the piston until all the water has become steam. From this point of the stroke to the end the steam will work expansively, and at the end of the stroke will be just equal to the pressure of the atmosphere. By its then passing through the eduction into a surface condenser (without injection, and without attempting to obtain a vacuum), it can be condensed and returned to the boiler.

The engine is applicable to any of the ordinary uses. Suppose it to be used in a factory; if it is required to reduce the

* British Association, 1857.

power of the engine in consequence of some of the work being thrown out of gear, this may be done in two ways, by reducing the temperature of the boiler, or by reducing the quantity supplied by the water cavity of the slide valve. In the former case the engine will work less expansively and with less pressure; in the latter more expansively, and with the same pressure at the first portion of the stroke.

By this mode of working engines safety, economy, increase of pressure, and compactness may be obtained, incrustation prevented, and all possibility of priming removed.

ROMAINE'S STEAM CULTIVATOR.

A trial of this machine took place on Friday, the 11th ult., in a field near Crosskill's Agricultural Implement Works, Beverley. It differs from all others hitherto brought before the public for the purpose of applying steam power to the cultivation of the soil, in entirely dispensing with the use of ploughs, ropes, or auxiliary implements. It is a 14-horse portable steam-engine, capable of propelling itself, combined with, and giving motion to, a rotary digger, which is said to pulverize the land completely to any required depth. The engine and boiler are constructed in a similar manner to the portable agricultural engines now in common use, and are carried by a pair of high broad wheels, and by two smaller wheels in front. The large wheels are driven round by the engine, and the front wheels used for steering; but by a simple disengaging arrangement, the latter are left perfectly free when the machine has to be turned round, and by driving one of the large wheels while the other remains stationary, the implement can be turned completely round in its own length. The cultivating part of the machine is carried by a strong frame attached to the boiler, and consists of a hollow cylinder 6 ft. 6 in. long, and 2 ft. 6 in. in diameter, armed with knives or cutters on its outer surface. The cutters are of wrought iron, and sufficiently strong to enter the land, and encounter roots, stones, or other obstacles without injury; but in case of accident they can be readily replaced at small cost, and without delay, as each is secured separately by bolts to the outside of the cylinder.

The machine is the invention of Mr. Robert Romaine, a Canadian, and was shown at Paris at the Great Exhibition of 1855. It there attracted the attention of Mr. Crosskill, who induced the inventor to bring it to Beverley, and during the last two years two machines have been constructed at the Beverley Iron Works, and experiments carried out for the purpose of fully developing the principles of the invention and perfecting the details of the machinery.

The implement commenced operations at one end of a field of strong clay stubble, and traversed its entire length, transforming a breadth of 6½ feet into a perfect seed-bed, equal, it is said, to what could have been produced by twice ploughing and harrowing, or clod-crushing. On its arrival at the headland, it turned round in less space than would have been required by two horses with a common plough, and returned along the side of the work already done. The cultivation of the field was thus proceeded with, no vacant space being left except the two small headlands, which could easily be finished by the machine after the rest of the ground was done.

The machine is said to be capable of cultivating from five to seven acres per day, at an expense (including engine-driver and assistant, coals, man with horse and cart to fetch water, and wear and tear of machine) not exceeding 35s. to 40s. per day.

ON MOLTEN SUBSTANCES.*

BY J. NASMYTH, ENGINEER.

THE author's object in this paper is to direct the attention of scientific men to a class of phenomena which, although in their main features they might be familiar to practical men, yet appeared to have escaped the attention of those who were more engaged in scientific research. The great fact which he desired to call attention to is comprised in the following general proposition; namely, that all substances in a molten condition are specifically heavier than the same substance in an unmolten state. Hitherto water has been supposed to be a singular and special exception to the ordinary law; namely, that as substances were elevated in temperature they became specifically lighter; that is to say, water at temperature 32° on being heated does on its progress towards temperature 40° become more dense and specifically heavier until it reaches 40°, after which, if we continue to elevate the temperature, its density progressively decreases. From the facts which Mr. Nasmyth brought forward, it appears that water is not a special and singular exception in this respect, but that, on the contrary, the phenomenon in relation to change of density (when near the point of solidification) is shared with every substance with which we are at all familiar in a

* British Association, 1857.

molten state, so entirely so that Mr. Nasmyth felt himself warranted in propounding, as a general law, the one before stated; namely, that in every instance in which he has tested its existence he finds that a molten substance is more dense, or specifically heavier, than the same substance in its unmolten state. It is on account of this that if we throw a piece of solid lead into a pot of melted lead, the solid, or unmolten metal, will float in the fluid, or molten metal. Mr. Nasmyth stated, that he found that this fact of the floating of the unmolten substance in the molten holds true with every substance on which he has tested the existence of the phenomenon in question. As, for instance, in the case of lead, silver, copper, iron, zinc, tin, antimony, bismuth, glass, pitch, rosin, wax, tallow, &c.; and that the same is the case with respect to alloys of metals and mixtures of any of the above-named substances. Also, that the normal condition as to density is resumed in most substances a little on the molten side of solidification, and in a few cases the resumption of the normal condition occurs during the act of solidification. He also stated that, from experiments which he had made, he had reason to believe that by heating molten metals up to a temperature far beyond their melting point, the point of maximum density was, as in the case of water, at 40° about to be passed; and that at such very elevated temperatures the normal state, as regards reduction of density by increase of temperature, was also resumed, but that as yet he has not been able to test this point with such certainty as to warrant him to allude further to its existence. Mr. Nasmyth concluded his observations by stating, that he considered this to be a subject well worthy of the attention of geologists, who might find in it a key to the explanation of many eruptive or upheaving phenomena which the earth's crust, and especially that of the moon, present; namely, that on the approach to the point of solidification molten mineral substances then beneath the solid crust of the earth must, in accordance with the above-stated law, expand, and tend to elevate or burst up the solid crust—and also express upwards, through the so cracked surface, streams more or less fluid of those mineral substances which we know must have been originally in a molten condition. Mr. Nasmyth stated, that the aspect of the lunar surface, as revealed to us by powerful telescopes, appeared to him to yield most striking confirmation of the above remark. He concluded by expressing a hope that the facts which he had brought forward might receive the careful attention of scientific men, which their important bearing on the phenomena in question appeared to him to entitle them to.

HOW'S PATENT BRUSHES FOR CLEANING BOILER TUBES, &c.

Mr. Andrew Peddie How has patented a very useful improvement in the construction of the brushes used for cleaning boiler and other tubes. It consists in forming them in two or more parts, and causing them to expand or contract, in order to fit different sized tubes. The invention has been received by engineers with much favour, and will in all probability come into general use. The best form in which it has been carried out is shown in the accompany-

Fig. 1.

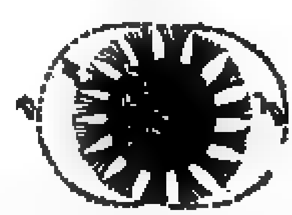


Fig. 2.

ing engravings, fig. 1 being a longitudinal section, and fig. 2 an end view. The spindle A has on it a loose bolt, B, (between two collars) having formed on it, the pins, B′, B′, which pass through the frame or body, G, of the brush. It has also at its

end right-handed and left-handed screws, C', C', working through the ends of the frame, and also through the wedges, D, D', at each end. In these wedges, grooves E, E, are formed, and into these grooves the projections, *a*, *a*, on the castings, F, F, take. By turning the spindle A, the wedges D, D', are drawn together, and the parts of the brushes forced outward, until the bristles or wires, H, H, come, for instance, into the position, *b*, *b*, the wedges coming into the positions, *c*, *c*. By turning the spindle in the opposite direction the brushes will be brought together. The brushes are, where desirable, formed in more than two parts.

SUBMARINE ELECTRIC TELEGRAPH CABLES.

M. P. A. Balestrini, of Brescia, Italy, has obtained a patent in this country for an invention comprising several improvements in connection with submarine electric telegraphic cables. The first part of the invention relates to a means of connecting the ends of submarine telegraph cables to the shore, and in protecting them from rubbing against rocks, or on the shore. For this purpose the cable is passed through a series of cylindrical blocks of wood placed at short distances apart, around each of which a bar of steel is wound spirally, the blocks of wood being held together by chains. One end of the series of blocks of wood is fixed to the shore, and the other end to the cable. The second part of this invention consists in a means of joining the ends of two or more submarine telegraphic cables together. For this purpose a cylindrical box is used, over which is bolted a suitable cover on the top of which there is a hook for lowering the box into the water. The ends of the cables to be joined are passed through small tubes fixed in the cylindrical box, and are held there firmly by a clamp, the openings through the tubes being closed perfectly water-tight. To the ends of these tubes may be hinged a series of small tubes jointed together, so as to allow the cables to adjust themselves without forming angles. In the interior of this cylindrical box there is fixed another smaller box, in the sides of which there is a number of small holes through which the ends of the telegraphic wires of the cable are passed, a communication being made between the wires opposite each other by clamping them between plates of copper. In order perfectly to insulate the different wires from each other the interior of the box is filled with resin or other non-conducting material, leaving room for the movement of the upper plates of copper when it is required to unclamp the different wires, the box being covered in watertight by means of a suitable lid. On the outside of the cylindrical box is a number of projecting arms, through the ends of which a circular bar passes, and when it is required to raise the box from the water, an anchor is let down and made to catch in the bar. The third part of the invention consists in winding around the centre cord of submarine cables, in which the insulated wires are laid, a thin copper wire in long open spirals, in order to carry off the induced electricity from the insulating material.

ON THE REINTRODUCTION OF ARMS OF DEFENCE INTO MODERN ARMIES.

II.*

To the Editors of the Mechanics' Magazine.

Gentlemen,—"A return to the use of defensive armour of any description for infantry, &c., is objectionable, and too inconsistent with the requirements of modern warfare to be entertained;" that is the judgment pronounced in an official quarter with respect to the suggestions which I attempt to give in these papers. But as that opinion has evidently been dictated by a view in which the words "arms of defence" appeared only as most intimately associated with that heavy and cumbersome "armour" which was a requirement of a warfare that was "modern" centuries ago; as any improvement must, of necessity, be inconsistent "with the state of things at the time being," simply because it is an improvement; and as, lastly, these suggestions are likely to draw attention, at least, to the possibility of protecting, and hence saving, the lives of hundreds, yea, thousands of our fellow-men, I doubt not but what you, gentlemen, will kindly grant me permission to add the following concluding remarks to my former paper, for I doubt not, that many of your readers, of certainly greater ability, knowledge, and experience than myself, might be induced to consider the subject seriously, trying experiments, &c. In fact, I should suggest that the object, being one of national importance, should be promoted by voluntary contributions, that is, by each communicating any important result of his experiment, &c., to the *Mechanics' Magazine*, when, no doubt, a compound of great practical utility would be formed; at all events, it would be very strange indeed, if thus there should not be devised means by which, supposing that another war should break out, in which the plan of the strategic operations should be as little backed by a proper plan of political

* For No. I. see vol. lxvi., page 463.

operations as was the case in the last European war—and which war would hence be likewise productive only of expense and bloodshed, and nothing of importance besides—at least the loss of life might be greatly reduced. The loss of life occasioned by the improved description of small fire-arms was indeed fearful in the last war; and, considering that those improvements were and are in many respects as yet in their infancy, and that the soldiers themselves were in that last war not as yet thoroughly acquainted with the use of their improved weapons, it is very probable that, in any future war, the sacrifice of human life will become still more and alarmingly fearful; so that almost any man would naturally be led to devise means to prevent such sacrifice, and I hence do not at all see any merit in having suggested the idea first.

The principal aim in devising the shields would be, to construct them in such a manner that they would be completely bullet-proof, and have at the same time the least possible weight; for the latter, their weight would be almost the only objection against their introduction into modern armies (see some hints given in my last paper, No. 1762 *Mech. Mag.*) Some weight such a shield must decidedly have, and there ought hence to be made such arrangements that the shield-bearers would have to carry less weight in other arms, being perhaps armed with long-range revolvers instead of rifles or muskets.

The prodigious and heavy bearskins of the guardsmen do not appear to be inconsistent with modern warfare, although they decidedly are an oppressive burden and great encumbrance to the men. Caffres, when they ford a rapid river, carry heavy weights on their heads; but it is very improbable that those heavy weights on the heads of the guardsmen should have been adopted with such a view; and Englishmen would, I should think, certainly not require such contrivances in order to keep them steady in the current of battle. All that I now suggest is, that soldiers should be armed and equipped in such a manner that they would not carry one single ounce weight about them but what is of essential use to them; and proposing shields for the soldiers is nothing else but proposing that the weight which the guardsmen carry now on their heads, as a perfectly useless encumbrance, they should carry in such a manner as to protect themselves by it against the enemies' bullets; and it could hardly be said that this was an useless occupation.

It may be argued that in the field, for instance, in attacking an enemy that is posted in a wood, or other cover, the shields would be utterly useless, because that then we should advance against the enemies *à la debandade*; but advancing *à la debandade* would be advantageous only in case the enemies are not skilful sharpshooters, and armed only with the wretched muskets hitherto in use (which, as they seldom carry the ball in a straight line with the line of sight, are apt to make the men utterly regardless of taking careful aim); but if our enemies are good and skilled marksmen, armed with the very best description of rifles, and who to a certainty would pick off our men whenever they catch a glimpse of them, then I should fancy it would be far more preferable to advance against the enemies in a close body, with one or two files of shield-bearers in front and on the exposed flanks; for then, in spite of the (probable) superiority of the enemy in skill and weapons, we should come up to them, and within range of the bayonet, without losing one single man.

Each shield being constructed in a proper manner, with some soft substance in front, the shock of bullets striking against it would not be considerable; for the purpose, however, of rendering each shield more easy, and of enabling each shield-bearer to withstand the shock, even if several bullets should strike his shield all at once, I should suggest, that the edge of each shield should be so contrived, that it could be locked together with the shield on either side of it, so that the whole front would be like one shield. Of course, that connection between the shield would certainly not be strong enough to withstand the shock of a cannon-ball, and the respective shield that should be struck by a cannon-ball, would be torn out, and would have to be supplanted by a fresh shield.

The only argument which could be advanced in favour of bearskins, helmets, and other kinds of very heavy head-covering for the soldier, would be, that by such the head of the soldier is better protected against sword cuts; but even that argument is without any weight at the present time, excepting with soldiers who know nothing of bayonet-fencing. By the introduction of shields, however, there would be afforded to the soldier protection against the enemies' bullets, against which no exertion of the individual soldier, not even the most perfect skill in fencing, could be of the least avail; and every one must, by a careful weighing of existing and known facts, and their bearings, be brought to the conviction that the introduction of such a kind of defensive or protective armour, will, in the course of time, become a necessity, dictated by the great perfection to which small fire-arms will then have been brought.

As I stated in my former paper, various

kinds of shields may be devised, of such construction and composition, that, when at times they are not required as shields, they might be used for various other purposes, and here would offer itself another field for the ingenuity of your readers.

I am sure that the importance of the subject is such, that it would require no great efforts to direct to it the attention of any thinking mind, and I conclude by thanking you, Gentlemen, for having kindly afforded to me an opportunity of directing attention to the same.

I am, Gentlemen, yours, &c.,
G. J. Gunther.

5, De Beauvoir-villas, Mortimer-road, Kingsland, N.E., Sept., 1857.

THE WAVE LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

Gentlemen,—It would appear, even if we only limit our attention to what is published in your pages, that opinions in regard to the relations of power and speed in reference to steam vessels, are very unsettled. We have had communications from Mr. Armstrong and from "Nauticus," and also your own observations on the points discussed by them, and now our attention is directed to the subject by Mr. Moy, addressed to the British Association, in which there is an attempt to maintain the fallacy, that we can obtain increased speed without an increased expenditure of power.

It is quite true that when the resistance is constant, as in the case of friction, if that alone be considered, the expenditure of power is as the *distance*, whatever the velocity; and also, that when the resistance is as the square of the velocity, as that from air or water, and when consequently for a given *time*, the power is as the cube of the velocity, the expenditure nevertheless is only as the square of the velocity for a given *space*. Still, no alteration in the construction or form of a vessel will enable us to obtain additional speed without additional power, although we do agree to measure it by space, instead of by time, unless—realizing in practice, what is put theoretically in the first instance—the alteration be of that nature which would enable the vessel to skim and not divide the water. In that case, friction would *actually* be the only resistance, and being constant, we should witness the novel sight of an accelerated velocity; but nothing of the kind can appear in any vessel, however sharply built.

It is quite certain, that if with the same vessel we double the speed we quadruple the resistance, and must have octuple the power; and it is equally undeniable, that by a judicious change of its form, the displacement continuing the same, a double speed will not then produce a quadruple resistance. Now, the question is, how far we can advance in this direction. Mr. Moy says, that though moving with a double velocity, if the bow of the vessel is doubled in length, the water will be moved aside with only the same velocity as before. Very well, but if it were not so, the resistance which it would oppose would be as the square of the velocity of the vessel, or fourfold; consequently, it will now be simply as that velocity, or only twofold; and the propelling power therefore will be as the square thereof, or four times greater than before, because it is the product of the double pressure required to meet the double resistance multiplied by its own double velocity. At the same time it must be admitted, that the expenditure of power for the distance gone will be simply as the velocity, or only two-fold. It must be remembered, however, that this result is dependent on improvement in the form of the vessel, and that the improved form itself, with a change of velocity, would as before be subject for each particular, namely, resistance, power by time, and power by space, to its appropriate law of the square, the cube, and the square. Now, Mr. Moy asserts that in the case put, only a double propelling power would be required, which implies that the resistance would continue the same as before (!) and, therefore, that for the voyage only the same amount of coal would be burnt as before, which, if the premiss were true, would of course be correct. It would follow, also, that a very small addition to the double power exerted by the engine would constitute an accelerating force, and produce, whilst the steam could be kept up, a constantly increasing velocity until the resistance of the air, and not that of the water enforced uniform motion!

Mr. Moy objects to the word *resistance*, and would substitute *duty*. He misapprehends the meaning of the latter word; it does not include time, and it does include resistance. It is motion in opposition to resistance measured by the space traversed, without any reference to time, or consequently to velocity. What he understands by it is mechanical power.

I am, Gentlemen, yours, &c.,
Benjamin Cheverton.

MILLER'S METHOD OF PROPELLING VESSELS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In number 1780 of your Magazine you published a brief account of a method of propulsion on which, if you will indulge me so far, I wish to make one or two observations.

The invention referred to is a striking instance of the astonishing illusions under which inventors occasionally labour. Mr. Miller's arrangement for propelling vessels is undoubtedly a most successful solution of the famous problem "how not to do it." This invention may perhaps be called a modification of the method of propulsion by jets. Indeed, Mr. Miller's propellers have the same relation to the jet method that a corpse has to a living man. It is the jet method with the life destroyed. Take the London Fire Float, close the ingress valves and open the egress valves, and you have Mr. Miller's propellers exactly. Every one will see that by this process of transformation the pumps would be no longer capable of propelling the vessel, or of doing anything else. These propellers, when set to work (supposing them to move as fast backward as forward), would have the same tendency to drive the ship astern as ahead. The back stroke would generate as much sternway as the forward stroke would headway. This is readily seen. When the piston of the propeller as well as the vessel is at rest, there is equilibrium between the horizontal fluid pressures on the after and fore parts of the ship. When the propeller receives a positive stroke the pressure on it is increased, and this increase of pressure operates to impel the vessel forward. In the negative stroke of the propeller the pressure on it is diminished, and therefore the pressure on the bow tending to drive the vessel astern will exceed by the diminution the pressure abaft tending to drive the vessel forward. So the effect of the double stroke will amount to just about zero. There are only two methods imaginable by which these propellers could be rendered at all effective, and those I think are *purely imaginary*. Either Mr. Miller must do away with the back stroke altogether, and make his voyage with one stroke of his propellers, or he must bring his vessel to anchor every time his propellers are to perform the back stroke.

I am, Gentlemen, yours, &c.,
A MECHANIC.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—What a pity it is that Mr. Miller, whose method of propelling vessels was described at page 271 of your Magazine for Sept. 19, did not find out, and take the advice of, the Editor of the *Meteor of Science* before he took out a patent for such an extremely stupid apparatus! Will you kindly permit me to tell Mr. Miller that his squirts would never send a ship ahead a single mile if he clapped all the steam engines in Europe on to them. They are most certainly *no go*. I suppose Mr. Miller will neither understand nor believe me if I tell him why; but I may as well try him. The reason simply is that, on the average of a number of strokes he would do no *work* upon the ship, for the backward work done by the fluid on the bow while the propellers returned forward (after completing a stroke) would be equal to the forward work done by the propellers during the stroke.

Mr. Miller has, it appears, spent one fifty pounds on his "chimera," and he is welcome, if he pleases, to spend another, or a thousand others; but if he will accept my advice he will expend no more, unless he may choose to send me, through you, a douceur of £100 for this letter, which ought to save him much more than that sum.

I am, Gentlemen, yours, &c.,
SCREW.

MR. DRAKE'S IMPROVEMENTS IN CANNON.*

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I quite agree with your Plymouth correspondent, "that *we need not import from across the Atlantic what we can provide better at home*;" and I feel convinced, if our Government had been more inclined to investigate the merits of those guns designed expressly for the state's use, as mentioned in my former letter, no such order as that given by Lord Panmure would have been executed in New York; and I trust my motives for making this observation will not be mistaken by the readers of the *Mechanics' Magazine*; for I still hold the right of the minister to procure from any quarter of the world that which may be best for the public interest to obtain. It is due to Dr. Drake, whose name I have had occasion to mention, to state that, while studying the merits of cannon with me at the strongly fortified garrison town of Mons, in Belgium, in 1838—just previous to our visiting Glasgow—he invented a gun, much the same in shape and principle as the American gun described in a former number; but his subsequent improvements I thought better of, particularly his com-

* We have been compelled to reduce the length of this letter considerably, and to defer its publication for a week.—EDS. M. M.

pressed-air and hydraulic *safety breech* guns, of which I have several in my keeping.

As your correspondent appears pleased with the form and "mechanical *simplicity*" of my gun, published in No. 1779, it would have given me much pleasure had he favoured your readers with such suggestions as he may consider necessary for its improvement; for, no doubt, professionally, he is capable of detecting objections which, to a casual observer, would pass unnoticed. Probably Mr. Jackson may still feel inclined to name his suggestions, and I can assure him, however they may be at variance with my view of the subject, I shall receive them with satisfaction, and thank him for his trouble.*

I do not consider the breech screw necessary to keep the joint between the breech and tube or "director" in close contact, neither do I consider it necessary to insert one part into the other to prevent the escape of gas; nor do professional gentlemen who have discussed this point with me, object to the simple way in which the two parts are brought together; at the same time, it may be well to face the breech end of the tube with gun metal or copper, to admit of its working freely, and to keep a closer joint, the pivot being so formed as to impinge tightly when the charge chamber is in a true line with the bore of the tube; and I will venture to remark, although I have introduced a duplex charge chamber to facilitate the firing, a single charge breech, it is presumed by practical men, will be sufficient to allow of this gun being fired three to one with the American invention, and with a less number of men, the breech being charged alternately on each side of the gun, as originally intended. As it has been remarked that the bed and carriage may be made of wrought iron, I beg to say that I have designed both; but I consider cast iron adequate in every respect, as its weight cannot be of any consequence for land purposes.

It has also been observed that I do not throw the same weight of shot as the American gun of the same calibre. Now, to this I beg to reply, I propose to fire elongated shot equal in weight to three 32-pound spherical shot—say 100 lbs., which I presume the tube or director adequate to sustain, although it is a converted 56 cwt. gun, strengthened at the breech by the wrought iron band of 2 inches in thickness, and ten or twelve inches broad. The bursting of guns generally takes place in the wake of the charge, and seldom extends so far as the trunnions, consequently the charge chamber is to be cast in proportion to the weight of shot. If it be desirable to fire from a 6 inch calibre gun, elongated shot of greater length and weight, a tube of greater substance at the breech end must be cast expressly, but I do not presume the American 6-inch guns are constructed to fire projectiles of 170 lbs. in weight, which must be intended for a 8½ inch, and not a 6-inch calibre.

The mechanical simplicity and form of my gun completely mounted, has been noticed to me by several, and every man of experience must be aware that simplicity is utility obtained by repeated efforts to arrive at the results desired.

Your correspondent remarks, that there must be "something rotten in the state of Denmark," which has operated to my disadvantage, as every impartial observer must readily admit; but I have shown no disposition to allow the past to impede the progress of the future, however severely I may have suffered from neglect or other causes too palpable to be mistaken; and it is to be hoped, the Minister at War will see fit to consult the interest of the state by causing those plans which have been undertaken by me under circumstances too astounding and too tedious to be made public through a professional journal, to be more appropriately investigated and acted upon in unison with their merits.

I can assure his Lordship, the inventor seeks no return for his exertions and money expended, if it cannot be clearly shown by practical demonstration that he is worthy of it. I think it right to state that, both Lord Panmure and the Right Hon. Sir George Grey, through whom the invention was submitted to the consideration of the Ordnance Committee in 1854, have been both supplied by me, with the *Mechanics' Magazine* of Sept. 12, in which the English gun and my accompanying letter are made public.

I am, Gentlemen, yours, &c.,

JOHN POAD DRAKE.

London, Sept. 27, 1857.

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* In a letter, dated London, Sept. 28, addressed to ourselves, Mr. Jackson says, "In my letter from the west I hinted at some modifications, but on maturely considering the invention, I am inclined to leave the issue to the experiments which the British Government, in justice to a British subject, should lose no time in preparing. . . . . Perhaps the inventor will pardon the liberty I take in suggesting that the pivot might be more under the middle of the breech, to bring the centre of gravity on the other side of the fulcrum. At present we have a lever of the second order; but, on the other hand, this arrangement resists the shock more steadily than a lever of the first. I had an idea the back screw would strip, but I now think it perfectly safe, as there can be little more strain on it than acts on the present trunnion."

A GOOD SERVICE RIFLE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The following is an extract from the *Scientific American*, of the 12th ult.:—"Then came the piece so well known as Sharpe's. It has the gas-choke in it, and it fired, by the aid of the former arrangement, *eighteen shots* in *fifty-five seconds*," an unprecedented rapidity; not but that any breech-loader could do the same with proper arrangement for primers. Let Americans think of this:—Are soldiers brought before an enemy for the purpose of *receiving* or of *giving balls?* Great as the rapidity of this firing certainly was, I will engage to equal it by loading at the *muzzle* my rifle one-pounder brass gun, with which I made successful experiments at Woolwich, about eighteen or twenty years ago, with elongated percussion shells, in presence of the late Lord Hardinge, and several other officers of high rank of both the naval and military services. If I were to arm a tenth legion composed of the fervid youth of England, it would be with Sharpe's breech-loading rifle carbine *elongated* to musket length.

I am, Gentlemen, yours, &c.,

J. NORTON.

Rosherville, Oct. 3, 1857.

MISCELLANEOUS INTELLIGENCE.

INDIA-RUBBER SETTINGS FOR TEETH.—Vulcanite or hard India-rubber has long been adopted, under Goodyear's patent, for the setting of teeth in America. Its advantages are spoken of by the leading dentists there as far superior to any other material, as it possesses all the hardness of bone with the smoothness of ivory. Its durability admits of no doubt, and the capability of obtaining the semblance, both in colour and form, of the mouth's interior is equally remarkable. Some specimens of this new process have been lately exhibited at scientific meetings in London and elsewhere, and we believe others may be seen in Goodyear's Vulcanite Court at the Crystal Palace, and in the theatre of the late Western Literary Institute on the west side of Leicester-square.

THE CORT TESTIMONIAL FUND.—Mr. Richard Cort, who has expended much time and energy in promoting the collection of the above fund, for the benefit of himself and three sisters, all of whom receive trifling pensions from the Government, has found it necessary to caution the public against handing over their subscriptions to a person named Marks, who has also been collecting for the fund. Mr. Cort alleges that of all the money, amounting to some few hundreds of pounds, which has been collected by Mr. Marks, the only amounts handed over to his Committee are a few crossed cheoks, which were not otherwise available. Whatever may be the result of further investigation into the matter, it is highly desirable that subscriptions should for the present be paid to Mr. R. Cort, and to him only.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

BESSEMER, H. *Improvements in the manufacture of iron and steel.* Dated Jan. 24, 1857. (No. 221.)

These were described at page 134, of No. 1774.

STUBBS, W., and J. BURROWS. *Improvements applicable to water-closets.* Dated Jan. 24, 1857. (No. 222.)

This relates to supplying water-closets with water from the street mains of towns, &c., without (if required) the water passing into the cisterns used for domestic purposes, and at the same time preventing waste. A small enclosed chamber is used through which the water to be used passes. The inlet and outlet of this chamber is regulated by a two way cock or valve, which by one motion opens one passage and cuts off the other.

FORTESCUE, J. *Improvements in the construction of the furnaces of bakers' ovens, for the purpose of consuming smoke, which improvements are also applicable to the consumption of smoke in other furnaces.* Dated Jan. 26, 1857. (No. 224.)

The furnace has outer and inner doors, and at the top, at the end next the oven, a block or bridge extending downwards across the furnace. Over the inner door is an opening across the furnace, and the outer door has a projecting block, which, when that door is closed, fits into the opening and renders it air-tight. When fresh fuel is supplied to the furnace, the outer door is left open, and air admitted. The admission of the proper quantity of air is regulated by opening or closing the outer door.

TIZARD, W. L. *Improvements in fermenting, cleansing, and attemperating apparatus to be employed in brewing.* Dated Jan. 26, 1857. (No. 227.)

This invention was described and illustrated at page 130 of No. 1774.

BROOMAN, R. A. *Improvements in the preparation of woollen hats, bonnets, and bodies for hats and bonnets.* (A communication.) Dated Jan. 26, 1857. (No. 228.)

This refers to that part of the preparation which precedes fulling, and consists in combining with the carding engine a double cone, upon which the web, as it comes from

the card, is received and wound. Also in arrangements of machinery for imparting at the same time rotary and oscillating motions to the double cone, whereby the web will be wound upon and all over it. After being so wound, it is divided at the base common to both cones, and the material for two hats, bonnets, or bodies obtained.

BROOMAN, A. R. *A method of lubricating and preventing the heating of axles, journals, and bearings in railway engines and carriages.* (A communication.) Dated Jan. 26, 1857. (No. 229.)

This consists in applying a stream of cold water to the journals, axles, &c., in locomotive engines and carriages through a pipe.

BROWN, W. H. *Improvements in coffins.* Dated Jan. 26, 1857. (No. 230.)

Charcoal, or other such substance is used to line the lid, or otherwise placed in coffins, and disinfecting matters, such as chloride of lime, &c., are applied by means of a suitable apparatus, to absorb the gases which proceed from the corpse.

HIGHTON, E. *Improvements in electric telegraphs.* Dated Jan. 26, 1857. (No. 232.)

When electric telegraphs are arranged, to render it possible to communicate at the same time from and to each of the terminal stations by only one line wire and the earth, an additional battery is used by the inventor to neutralise the influence of the line current on the instrument at the sending station, and for this purpose the finger key is so arranged that, at the same time that the line circuit is made, a short circuit is completed in the opposite direction, which includes the additional battery and the coils of the instrument.

JOHNSON, J. H. *Improvements in sewing machines.* (A communication.) Dated Jan. 26, 1857. (No. 233.)

This relates to apparatus for uniting or ornamenting fabrics by the ordinary tambour or chain stitch. It consists—1. In so constructing the machine as to form the chain stitch by the aid of a *stationary* hook. 2. In producing the feed-motion of the fabric by a hook attached for that purpose to the needle-head or carrier. 3. In the application of a peculiar clamp that will hold the fabric down during the forming and tightening of the loop, and relieve it at the moment the feeding is performed. 4. In a mode of guiding the needle as it enters the fabric.

CROSLAND, J. S. *Improvements in locomotive and other steam engines.* Dated Jan. 27, 1857. (No. 235.)

These consist—1. In exhausting the steam of such engines into tubes, (flues, or chimneys,) through which passes also the waste heat from the boiler tubes and furnace; the feed pipes may be carried through the said tubes. This arrangement may be variously modified. They also consist of several modes of preventing the pressure of steam acting upon the backs of slide valves. Another improvement consists in the combination of a solid piston body with the well-known V back ring and wedge front rings into which the V back ring is pressed, by the aid, in this instance, of a strong flat hoop spring behind; the rings are also cut into segments, and require no elasticity in themselves, but depend upon the spring behind.

DANGERFIELD, J. *Improvements in the manufacture of chains.* Dated Jan. 27, 1857. (No. 237.)

The object here is to effect a saving in the manufacture of links for chain cables, by making, bending, and scarfing the lengths of iron required for each link, or a length sufficient to produce several links, during the operation of rolling the iron into chain bars out of the puddled bar, thus avoiding one heating of the iron.

TURNER, W. A. *Improvements in the manufacture of starch.* Dated Jan. 27, 1857. (No. 238.)

This consists in reducing wax or other oleaginous substances to powder, and then mixing them with manufactured starch for the purpose of improving the quality thereof.

DOELLING, G. L. *Improvements in machinery or apparatus for forming screw threads.* Dated Jan. 27, 1857. (No. 239.)

Screw-cutters or dies are arranged to slide in radial grooves in a circular plate, which is fixed to a handle. Over this fixed plate is a moveable circular plate fixed to a handle, and the two plates are connected by a flange and groove. In the moveable plate there are eccentric grooves, in which projections on the screw cutters or dies slide. On the fixed plate is formed a projection in which a screw turns; the end of the screw, coming against the handle of the moveable plate, regulates the relative positions of the two plates, and consequently the distance that the cutters or dies are from each other.

BOUSFIELD, G. T. *Improvements in coating iron or other metals with tin.* (A communication.) Dated Jan. 27, 1857. (No. 240.)

This consists of depositing tin on to iron and other metals from a solution of a salt of tin in a certain manner.

STEWART, D. Y. *Improvements in moulding or manufacturing cast iron pipes.* Dated Jan. 27, 1857. (No. 241.)

This relates essentially to the moulding of cast-iron pipes of the faucet class, and consists of a mode of preparing the cores of

such pipes, a mode of placing the cores in the moulds previous to casting, and a mode of removing the same after the casting has been accomplished. The invention has reference more or less to an invention patented by Mr. Stewart, Jan. 4th, 1849. The invention also relates to an improvement upon the arrangements patented by Mr. Stewart, July 14th, 1846.

ELCE, J., and J. HEWITT. *Certain improvements in mules and other machines for spinning and doubling.* Dated Jan. 28, 1857. (No. 243.)

This consists—1. In a copping motion or combination of parts for actuating the fallers or copping rail to form the cops or bobbins. 2. In the application of a segment ratchet to the ratchet wheels used in giving motion to the screws of copping motions, to prevent the screw being turned round until the first few layers of yarn have been wound on the spindles. 3. In a combination of machinery for effecting the after draft.

HARLOW, R. *Improvements in apparatus to be applied to steam boilers.* Dated Jan. 28, 1857. (No. 244.)

This consists in a mode of applying the glass tube to steam boilers, and in securing it to the taps by union joints and vulcanised india rubber packings.

WHOWELL, C. *Improvements in machinery for stretching, drying, and finishing woven fabrics.* Dated Jan. 28, 1857. (No. 245.)

This consists—1. In a wire cage for delivering the fabric to the drying cylinder. 2. In connecting the ends of the wire cage and of the drying cylinder to side levers for varying the distance between the ends according to the width of the fabric to be operated upon. 3. In setting the ends of the wire cage and of the drying cylinder diagonally to their axes, to facilitate the delivering of the fabric, and to stretch it out to the full width. 4. In machinery for acting alternately on the ends of the drying cylinder, to cause them to rotate, and to impart the elastic finish to the fabric. 5. In the application of a wire cage of large dimensions for stretching, drying, and finishing fabrics.

CRANSTOUN, G. C. T., G. YOUNG, and J. LOVELL. *Improvements in generating steam.* Dated Jan. 28, 1857. (No. 247.)

This relates to the employment of the waste heat of steam boiler furnaces and flues for heating the feed water. Where several boilers are worked in concert, some are converted into a water heater for the supply of the rest with hot water, and heated by the flues of all the others, the heated currents from all the flues and furnaces of the other boilers being caused to pass round and through this heating boiler.

COOKE, T. *Improvements in ventilators for omnibuses, and in apparatus for actuating the same.* Dated Jan. 28, 1857. (No. 248.)

This consists in disposing ventilators immediately under the roof seat of the omnibus, with suitable openings in the riser on each side of that seat to permit free ingress or egress of air.

SISTERSON, W. H. *An improvement in cranes.* Dated Jan. 28, 1857. (No. 249.)

This invention was described and illustrated at page 121 of No. 1774.

BROOMAN, R. A. *An improved protective matting or fabric for sheltering plants, shrubs, and other vegetable productions, pits, frames, and other similar structures, together with machinery for manufacturing the same, and the mode of supporting it when in use.* (A communication.) Dated Jan. 28, 1857. (No. 250.)

This fabric is composed of a weft of straw, cane, bass, rush, reed, or other material, woven in with a warp consisting of two sets of warp threads, each set composed of two wires or stout cords twisted together.

NORTON, J. L. *Improvements in steeping or washing and rinsing machines.* Dated Jan. 28, 1857. (No. 253.)

This consists of a frame supporting rows of wooden beaters, lifted up by arms keyed upon horizontal shafts, and of a trough provided with a false bottom, moved upon rails by means of wheels and a rack and pinion. In order to rinse the articles a cylinder, having a series of curved spikes placed in a spiral direction on its periphery, is used, the axis of which cylinder moves in bearings in the framework of the machine. This cylinder has given to it a forward and backward motion by an eccentric, and a continuous slow forward motion in one direction. Below and partly encircling one side of the cylinders is a perforated diaphragm for guiding and bringing in close contact the wool or other material with the curved spikes of the cylinder.

NORTON, J. L. *Improvements in separating animal from vegetable fibres.* Dated Jan. 28, 1857. (No. 255.)

The rags, &c., are placed in the trough of a steeping apparatus. Dilute sulphuric acid, (from 2 to 14° of Twaddle) is admitted. The trough is then placed under a beating machine, and the rags are beaten until thoroughly saturated. The rags are then taken out of the trough, and the superfluous liquor extracted by a centrifugal machine. Afterwards the rags are passed through a drying machine, and the vegetable matter is thus entirely destroyed, and will fall away as powder or dust. The rags are then passed through a dusting machine.

CLARK, A. *Improvements in signal-lamps.* Dated Jan. 28, 1857. (No. 256.)

This is particularly applicable to signal-lamps used on board ship for signalling to the helmsman at night. It is necessary that the lamp should show a white, green, or red light, as may be required, and this is to be done with a single lamp, by surrounding the same with a rotating six-sided lantern, each side glazed with glass of one or other of these colours, and the opposite sides with glass of the same colour. Surrounding the revolving lantern is an exterior case, in which are two glass bull's eyes opposite to each other, one of which, when the lantern is in use, directs the light to the helmsman, and the other to the man on the look out. Thus the captain is able, by turning the revolving lantern, to show a light of either colour to the helmsman. To the helmsman is also visible the man on the look out.

WILSON, G. F. *Improvements in treating Burmese and such like petroleum.* Dated Jan. 28, 1857. (No. 257.)

This consists principally in a modification of the process patented by Mr. W. De la Rue, 25th of July, 1853. Whereas, he proposed to distil over the lighter parts of the petroleum by means of steam, then the heavier portions by means of superheated steam, and then to heat the products of such distillation by sulphuric acid, the present patentee heats the petroleum with sulphuric acid after its lighter products have been separated (by steam or otherwise) and whether the heavier portion be afterwards distilled or not.

DERING, G. E. *Improvements in lighting and warming trains of railway carriages.* Dated Jan. 28, 1857. (No. 258.)

This consists of combining apparatus for employing gas to be burned in the lamps of carriages for signals, and for lighting the interiors, and suitable stoves for warming the same. It is preferred to attach a separate carriage to each train, for carrying coal or other gas in suitable gasometers. Each carriage has attached to it a length of gas pipe from end to end communicating by branch pipes with the several burners.

CHAMBERLIN, H., jun. *Improvements in paving or covering the surfaces of roads, streets or ways.* Dated Jan. 28, 1857. (No. 259.)

This relates to forming surfaces of cast iron offering a good foothold for horses, reversible when one side is worn out, and permitting a free passage for water and dirt from the surface. It consists of a grated structure of iron.

SYMONDS, C. E. *Improvements in the manufacture of oxide of lead and its salts.* Dated Jan. 29, 1857. (No. 260.)

This consists in a mode of producing oxide of lead from chloride of lead by mixing chloride of lead with caustic barytes, caustic lime, or caustic magnesia, or mixtures of these earths. This oxide of lead may then be used either by itself or with acids to form salts of lead.

MALINS, A. *A new or improved mode of ornamenting castors for furniture, lamps, chandeliers, cornices, and cornice ends, curtain bands, and curtain pins.* Dated Jan. 29, 1857. (No. 262.)

This consists in constructing these articles in part of horn or hoof, or other animal substance or mixture, or composition having the same or nearly the same physical properties as horn. Or the inventor sometimes makes the said articles in the usual way, and adds thereto ornaments of horn or other similar substance.

SAMPSON, G. and J., and E. LEDGER. *Improvements in apparatus for effecting the folding or rigging of woven fabrics.* Dated Jan. 29, 1857. (No. 263.)

These consist in causing the fabric to be folded or rigged to pass between two plates folded to forms suitable to produce the desired folding, the one plate acting on the under surface of the fabric whilst the other acts on the upper, and as a sort of saddle to it. The fabric is conducted between these folding plates by suitable rollers. In some cases heat is applied to one or both of the plates to facilitate the operation.

BUSSY, C. DE. *The reduction of zinc ores.* Dated Jan. 29, 1857. (No. 265.)

This consists essentially in smelting zinc ores in a blast furnace, and causing the gases produced in that furnace, together with the vapour of zinc into which they are mixed, to pass through a second blast furnace, into which they are introduced at a short distance from the tuyeres. After traversing a part of the column of fuel contained in this furnace, the gases are drawn out and made to traverse a chamber or series of chambers in which the metallic zinc is condensed; or the patentee employs a single blast furnace of a peculiar construction to produce the effects obtained by means of the two furnaces above mentioned.

WEILD, W. *Improvements in looms for weaving piled fabrics, part of which improvements are applicable to looms for weaving other fabrics.* Dated Jan. 29, 1857. (No. 267.)

This relates—1. To a new arrangement of the wire motions described under the fifth head of the specification of a patent granted to the patentee in 1855, No. 505. 2. To looms for weaving pile fabrics where each pile thread is placed on a bobbin, the pile shed being formed by jacquard mechanism. 3. To modifications of the wire motion described under the fifth division of the specification before referred to. 4. To

improved arrangements for picking the shuttle in looms for weaving. This invention requires reference to the drawings in order to describe it completely.

PITMAN, J. T. *An improvement for the letter organization of the instrumental music scale.* (A communication). Dated Jan. 30, 1857. (No. 270.)

This consists in originating and giving form to two new representations to each of the seven musical letters belonging to the instrumental music scale.

THOM, J. *Improvements in the construction and mode of fixing artificial teeth.* Dated Jan. 30, 1857. (No. 271.)

The object here is to facilitate the attachment of artificial teeth, so that any one tooth of a set may be readily removed. A dovetailed groove is formed on the back of the tooth, which groove slides upon a corresponding wire attached to the artificial palate. When the tooth is slid upon the dovetailed stem it may be secured in its place by any suitable cement, the heating of which will permit the withdrawal of the tooth whenever it is necessary.

MONTAGU, S. *Improvements in packing-cases.* Dated Jan. 30, 1857. (No. 272.)

The object here is to prevent packing-cases from being opened surreptitiously. The patentee makes to fit around the edges or corners of such packing-cases pieces of sheet iron, the edges having been previously bent to fit into corresponding grooves or slits made in the wood to receive them.

CAMPIN, F. W. *The manufacture of a certain textile fabric termed by the inventor "tissu courroie."* (A communication.) Dated Jan. 30, 1857. (No. 277.)

This consists in the manufacture of a tissue or fabric which will serve as a substitute for leather straps and bands for driving machinery, &c. The warp and woof are formed of iron thread, galvanised, or of brass, copper, flax, cotton, wool, hemp, or any other textile substance. The loom is furnished with mechanism on Jacquard's system. Each thread of the warp forms a continual crossing with the woof.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

WALTON, J. *Improvements in looms for weaving.* Dated Jan. 24, 1857. (No. 217.)

This relates to means by which the selection of any of a series of shifting shuttle boxes may be obtained to bring any of the series in a line with the race of the loom, and applies either to rising and falling, or to rotary boxes. It consists in effecting the desired selection by the operation of series of arms in pairs with varying numbers of catches or drivers, and which arms are actuated by jacquard or other pattern surface aided by cam or tappet motion. It also relates to rotating shuttle boxes, and consists in connecting the shuttle chambers together by hinge connections, so that they may follow each other in succession over a cylinder or cylinders actuated as required.

GREEN, D. *Improvements in potters' kilns.* Dated Jan. 24, 1857. (No. 219.)

The furnace has a hollow bridge at the end of the fire-bars, and this bridge communicates by flues with the external air. The bridge is open at the top to admit the air which will be heated by passing through the flues to the fire. In the upper part of the furnace is another flue, which communicates with an opening across the furnace, and this opening is by preference formed of two fire-clay tiles, built into the arch forming the top of the furnace, so as to project downwards towards the fire-bars.

McONIE, A. *Improvements in the construction of centrifugal machines, or "hydro-extractors," used for the manufacture of sugar and other purposes, and in the arrangement of appliances to give motion to such machines by steam power.* Dated Jan. 24, 1857. (No. 220.)

This drum is of cast metal, and turned both inside and outside after it has been mounted on its spindle. The drum is perforated all over with holes countersunk on the inside. The spindle of the drum tapers towards each end, and its lower end is stepped into a cup-formed bearing, into which it is allowed to descend more and more as the brass wears, this adjustment being effected by a screw through the brass. The upper end of the spindle passes through a bush screwed into the bridge of the machine, and as the bush wears it is screwed further down. To stop the drum when necessary a friction strap is brought to bear on the lower part of it, by means of an eccentric mounted on an axis through the top of the case, and having a handle at its upper end. To drive the machine the inventor employs a small horizontal steam engine, which gives motion to a vertical axis carrying a large pulley from which a band passes to a small pulley on the spindle of the drum.

CONSTANCE, F. *An improved apparatus for casting and finishing types and vignettes used for printing.* Dated Jan. 26, 1857. (No. 223.)

This has reference to the furnace employed for melting and maintaining the metal in a fused state. An additional reservoir communicates with the furnace, so that as the metal is drawn off, a proportionate quantity may be supplied from the additional reservoir. By means of a piston, a

due amount of the molten metal is at intervals injected into a horizontal mould wherein the type (or vignette) is formed. The type is then by the apparatus carried forward between two cutters, which remove the burrs left by the casting from two of the sides of the type, and polish them. It then passes under a cutter which removes the jet attached to the casting at the end whereby it was fed, and then between two cutters, which remove the burrs from the two remaining sides of the type, and polish them, and is lastly subjected to other cutters, which act upon and dress its respective ends.

HAILE, J. *Improvements in machinery for the manufacture of nails.* Dated Jan. 26, 1857. (No. 225.)

This consists of improvements particularly applicable to the machinery patented by G. T. Bousfield, 15th May, 1855.

HENSEL, A. *The manufacture of German yeast from flour.* Dated Jan. 26, 1857. (No. 226.)

To obtain 10 lbs. of this German yeast the inventor takes 2½ lbs. of flour of malted wheat, the same of flour of malted barley, and the same of rye flour. To this mixture water is added (at 30° Reaumur) and the mass stirred to a thin paste. This paste is then brought to 45° Reaumur, by hot water, and afterwards cooled down to 30° Reaumur; then he adds 2½ lbs. of wheat starch dissolved in cold water; now 5 oz. of double carbonate of soda, and 2½ oz. of tartaric acid severally dissolved in lukewarm water, are added, together with 1½ lbs. of common yeast. The mass will now require hot or cold water to bring it to 27° Reaumur, after which it is left 12 hours to ferment. After this it is pressed through a hair sieve, and in eight or ten hours, the yeast forms on the bottom of the cask. This yeast is taken and put into double bags, which are submitted to pressure to free it from moisture.

HAMILTON, F., C. BURRELL, and J. BOYDELL. *Improvements in combining ploughs with locomotive engines.* Dated Jan. 26, 1857. (No. 231.)

Several ploughs are used, and are connected to the locomotive engine in such manner that the last of the ploughs may be still drawn forward up toward the headland, whilst the locomotive is turning. Each plough is made with a single handle, and the depth of ploughing is governed by wheels to each plough. Other arrangements are included.

HOOK, C. T. *Improvements in the manufacture of paper.* (A communication.) Dated Jan. 27, 1857. (No. 234.)

White paper is to be made from straw, reeds, sugar cane, &c., &c., by the employment of alkaline sulphurets, earthy sulphurets, or a combination of both, with hydrates of alkalis, previously subjecting in some cases the fibre to the action of fluoric acid gas, or any acid having power to dissolve silica; percolation is applied during the boiling process.

WATSON, T. and T. SINGLETON. *Improvements in looms.* Dated Jan. 27, 1857. (No. 236.)

This relates to the driving motion of looms, and instead of the usual fast and loose pulleys used, the inventors fix a pulley fast upon the crank shaft with the inside bevelled a little. They make the loose pulley with an additional rim, being bevelled to fit the interior bevel of the fast pulley, so that when the loose pulley is pushed into the fast pulley, motion is given to the loom, and when it is withdrawn the loom will stop. They also fix a compound tumbler in the shuttle, this tumbler having a fine spring across the top, so that the weft thread by pressing upon the spring will press it down, pass under it, and be kept in its place by the spring being in contact with a small projection in the tumbler, it cannot rise, but may be depressed.

HUNTER, C. *Improvements in bleaching or cleaning textile fabrics or materials, and materials used for making paper.* Dated Jan. 28, 1857. (No. 242.)

This consists essentially in employing currents of electric fluid, in combination with the chemical agents used in the bleaching process in such a manner as to promote the chemical action of such agents upon each other, or upon the colouring matters in the materials being bleached.

HARRIS, J. *Improvements in lighting gas for illumination.* Dated Jan. 28, 1857. (No. 246.)

This consists in applying to burners a substance which will ignite a gas permitted, at required times, to arrive in contact therewith. This effect may be obtained by causing a stream of hydrogen to fall upon spongy platinum.

HOW, A. P. *An improved anti-garotte cravat.* Dated Jan. 28, 1857. (No. 251.)

This consists in setting a number of barbed or plain points in a linen, or other back, or in a stiffener as used for cravats or stocks, and in covering the same with silk for being worn round the neck. The points do not protrude beyond the covering.

BROOMAN, R. A. *An improved method of elevating water and other liquids.* (A communication.) Dated Jan. 28, 1857. (No. 252.)

This consists in elevating water for fountains, &c., by means of a piston driven upwards by springs compressed when the force thereof is suspended, to act again, by a strap or belt connected to a plate against which

the top of the spring presses, or connected to the top of the spring, which belt is wound round a roller at the bottom of the frame or stand, in or to which the spring is fitted.

GRANT, W. *Improvements in the manufacture of hurdles and gates.* Dated Jan. 28, 1857. (No. 254.)

Each hurdle or each gate is so made that the uprights may be moved towards or from each other before being fixed in the ground, and thus offer a higher or lower fence as may be required.

HEYWOOD, W. *Improvements in boilers for generating steam.* Dated Jan. 29, 1857. (No. 261.)

This consists in constructing boilers with a fire grate at each end in internal flues, and in conveying the products of combustion from each grate to a chamber, whence they pass to other grates under the boiler; the products of combustion from these lower grates are conveyed again through tubes within the boiler, and then pass into flues outside the boiler.

JAY, S., and G. SMITH. *An improved hood or covering for the head capable of being used either separate from, or in combination with, other garments, such as cloaks, mantles, capes, dressing-gowns, and other entire or partial coverings for the human body.* Dated Jan. 29, 1857. (No. 264.)

This consists principally in combining a mechanical hood with a cloak, mantle, or other external garment for enabling such hood to be used as a partial or entire covering for the head when necessary without resting thereon.

McDONALD, J. R. *Improvements in the manufacture of India-rubber over shoes.* (A communication.) Dated Jan. 29, 1857. (No. 266.)

The object here is to so construct an India-rubber over shoe that the foot may be inserted or removed without using the hands. The quarter and heel are made of hardened or thick rubber to withstand the thrust of the foot. To the outer and back part of the heel, formed still as aforesaid, is fixed a projection, whereupon to apply the toe to remove the over shoe.

LAVIGERIE, P. E. L. DE. *Certain improvements in the manufacture of comforters, scarfs, and other like coverings for the neck.* Dated Jan. 30, 1857. (No. 268.)

This consists in the manufacture of a neck comforter or scarf, wove of a round form, and without selvage, upon an ordinary lace machine.

FARRAR, J. *Improvements in apparatus for regulating the pressure and flow of gas.* Dated Jan. 30, 1857. (No. 269.)

This consists in the adaptation of a valve to the inlet or outlet pipe or chamber. The valve is formed with a dish or tube having conical or V-shaped openings at its lower end which dips into mercury in a chamber formed around the end of the inlet or outlet pipe or chamber, so that the valve in its motion will, by means of the openings, shut off or regulate the pressure and flow of the gas when actuated by apparatus partaking of the back pressure of the gas not required to be consumed at the burners. The inventor also uses a float for communicating the said back pressure.

CHIBNALL, J. R. *An improved method of burning or consuming smoke.* Dated Jan. 30, 1857. (No. 273.)

This consists in placing in a chimney, flue, smoke-way, or channel a gas-burner or coil, or bent gas-pipe perforated at intervals for the issue of gas. The gas being lighted, the smoke passing through the burner becomes burnt or consumed.

PROVISIONAL PROTECTIONS.

Dated June 16, 1857.

1678. William Smith, of Salisbury-street, Adelphi. Improvements in steam generators. A communication from J. M. Prost.

Dated July 24, 1857.

2030. Thomas Williams, of Aberdaron, Carnarvon, engineer. An improvement in the construction of ships or vessels, whereby their draught may be regulated.

Dated September 4, 1857.

2318. Archibald Turner, of Leicester, elastic web manufacturer. Improvements in the manufacture of elastic fabrics.

Dated September 7, 1857.

2334. Benjamin Parker, of Hammersmith, surveyor. A new elastic composition for coating, cementing, bedding, and otherwise protecting bodies, also applicable to the construction or formation of articles to which it may be suitable.

Dated September 8, 1857.

2338. George Josiah Mackelcan, of Falcon-street, Falcon-square, engineer. Improvements in floating docks.

2342. John Marland, of Fernlee Vale, Saddleworth, York. An improvement in the manufacture of cop tubes.

2344. William Geach, of Prospect-place, Falmouth. Improvements in machinery for propelling vessels.

Dated September 9, 1857.

2346. Stanislas Hoga, of Charlotte-street, Fitzroy-square, gentleman. Improvements in apparatus for generating electricity and for transmitting electric currents from place to place.

2348. Alexander Hédiard, civil engineer, and Sénateur Levieux, manufacturer, both of Paris. An improved boiler for generating steam.

2350. Edward Lavender, of Aston-street, Limehouse. An improvement in distilling products from coal.

2352. Joshua Butters Bacon, of Brunswick-square. Improvements in machinery for manufacturing horse-shoe nails. A communication.

Dated September 10, 1857.

2356. Marin Joseph Alphonse Mille, miner, and François Canal, both of Paris. Improvements in producing gas.

2358. James Fenton, of Low Moor, York, civil engineer, William Thomson the younger, of Wakefield, railway contractor, and Thomas Snowdon, of Middlesboro'-on-Tees, iron master. Improvements in the permanent way of railways.

2360. William Clark, of Chancery-lane. Improvements in Jacquard apparatus and in the pattern surfaces of such apparatus. A communication.

2362. James Harrison, of Red Lion-square. Improvements in apparatus for producing cold by the evaporation of volatile liquids in vacuo.

2364. Gustav Brüninghaus, of Dortmund, Prussia. Improvements in the treatment of iron ore (crude iron) for the production of iron and steel.

Dated September 11, 1857.

2366. Thomas Silver, of Philadelphia, U.S., gentleman. A machine or apparatus for regulating or governing the paying out or delivery and the laying down of submarine or oceanic telegraph cable, parts of which are also applicable for taking and recording soundings, and for other purposes.

2370. Simeon Colbeck and William Henry Colbeck, both of Batley, York, woollen cloth manufacturers. Improvements in looms.

Dated September 12, 1857.

2372. Nicholas Fisher, of Milton, Northampton, farmer. Improvements in machinery combining operations in preparing land for agricultural purposes.

2374. Charles Watson, of Alfred-place, Bedford-square, gentleman. An improved apparatus for curing certain bodily complaints.

2376. John Edwards, of Aldermanbury. Improvements in railways to facilitate locomotive engines ascending inclines.

2378. James Leeming, of Bradford, York, machine maker. Improvements in looms for weaving.

Dated September 14, 1857.

2382. William Jenkins, of Miles Platting, Manchester. Improvements in the furnaces or fire boxes for locomotive boilers to adapt them for the consumption of coal and the smoke arising therefrom.

2384. David Thorpe Lee, of Birmingham, manufacturer. A new or improved washing machine.

Dated September 15, 1857.

2386. Alexander Gray, of Glasgow, manager. Improvements in lubricating mechanism.

2388. John Ashby, of Croydon. Machinery for cleaning wheat and other grain or seed from smut and other injurious matters.

2390. Thomas Grahame, of Leamington. Improvements in grinding corn and in generating gas on inland waters.

2394. Thomas Robson, of Critchill-place, Hoxton, warehouseman. Improvements in washing machines.

Dated September 16, 1857.

2396. Prosper Bernard Godet, of Paris, gentleman. A new mode of illustrating literary productions.

2400. Charles William Lancaster, of New Bond-street, gun manufacturer. An improvement in breech loading guns and in projectiles for the same. A communication.

2404. Richard Brown, of Glasgow. Improvements in moulding or shaping metals and other materials.

2406. Peter Armand Lecomte de Fontaine Moreau, of London. An improved railway brake. A communication.

Dated September 17, 1857.

2408. Johan Ernst Fridrich Luedeke, of Birmingham, mechanical engineer. A new or improved motive power engine.

2412. George Frederick Hack, of Hackney, lithographer. An improved cigar tube or holder for smoking cigars or tobacco.

Dated September 18, 1857.

2414. William Smith, of Salisbury-street, Adelphi. A novel machine or apparatus for engraving the metallic surfaces of printing rollers or cylinders. A communication from P. E. Gaiffe, of Paris.

2416. John Webb, of Bristol. An improved chaff cutter.

2418. Robert Watson Savage, of St. James-square, spring maker. An improved spring and appliances (for carriages and vehicles), which can also be adapted to use on shipboard, or otherwise, to maintain the equilibrium of articles placed on a platform provided with the said improved spring and appliances.

2420. Charlotte Delevante, of Kimbolton-place, Brompton, spinster. Improvements in bouquet holders.

2422. Samuel Faulkner, of Manchester, cotton spinner. Certain improvements in machinery or apparatus for carding cotton and other fibrous substances.

2424. Richard Watson, of Galashiels, Selkirk, N.B., manufacturer. Improvements in the manufacture of heddles or healds for weaving.

2430. Thomas Webster, of Place du Hâvre, Paris, gentleman. Improvements in the permanent way of railways. A communication from C. G. Limasson.

2432. Henry Bessemer, of Queen-street-place, New Cannon-street. Improvements in the manufacture of cast steel.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

2508. Rudolph Bodmer, of Thavies-inn, Holborn. Improvements in machinery or apparatus for winding, unwinding, reeling, cleansing, measuring, sorting, weighing, twisting, and doubling silk, and other fibrous substances. A communication from F. Buser, of Bâle, Switzerland. Dated September 29, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," October* 6, 1857.)

1445. P. M. Parsons. Improvements in making moulds for casting railway chairs and other articles in metal, and in apparatus for that purpose.

1454. N. J. H. Duplais. Certain improvements in the manufacture of felt hats and bonnets.

1460. G. O. de la Barre. Improvements in obtaining and applying motive power. A communication.

1482. W. Hart. Improvements in signal lamps.

1490. W. Holland. Improvements in umbrellas and parasols.

1495. E. Welch. Improvements in fire places and flues, and apparatus connected therewith.

1505. M. Petrovitch. The improvement of projectiles used with fire arms.

1509. R. E. Hodges. Improvements in gauges and scales.

1513. T. Hart. Improvements in the manufacture of lamp glasses, applicable to railway carriage and other lamps.
1514. N. Cox. Improvements in railways. A communication.
1515. A. Simpson. A new or improved slop and toilet-pail. Partly a communication.
1516. W. Wilber. Hot air apparatus for hulling and extracting oils from oleaginous seeds.
1517. T. Willis and G. Chell. Improvements in machinery for spinning, doubling, and winding yarn and thread.
1540. W. H. Walenn. Improvements in the electric deposition of metals and metallic alloys.
1541. J. A. Salmon. Improvements in steam engines, and in apparatus for feeding boilers, and in furnaces.
1554. J. Allen and J. Gibson. An improved union joint.
1589. E. K. Muspratt and B. W. Gerland. Improvements in treating waste liquors, produced in the manufacture of chlorine and in separating nickel, cobalt, and copper from liquids containing them in combination with manganese and iron.
1591. F. O. Ward and F. Wynants. Improvements in manufacturing manure and obtaining accessory products.
1607. J. Robertson. Improvements in machinery or apparatus for treating or preparing and boiling rags and other materials.
1632. E. Lemoine. Improvements in gasmeters.
1678. W. Smith. Improvements in steam generators. A communication.
1681. W. E. Newton. An improved mode of, and apparatus for, feeding in fuel to furnaces and fireboxes. A communication.
1708. H. H. Day. Improvements in preparing and vulcanising india-rubber, gutta percha, or other analogous gums. A communication.
1709. H. H. Day. Improvements in the manufacture of elastic fabrics.
1717. H. H. Day. An improved method of treating or purifying gutta-percha. A communication.
1830. W. Pole. Improved means for supporting telegraph wires. A communication.
1981. J. Russell, H. W. Spratt, and W. Press. A certain new method or methods, or new improvement or improvements in the construction, application, and use of machinery for propelling boats, ships, or vessels of any class or denomination.
2219. J. Glover and J. Bold. An improved material for transfer printing.
2227. H. Hodges. Improvements in the manufacture of gunpowder.
2251. J. J. Tucker and G. Blaxland. Improvements in steam boiler and other furnaces.
2317. W. E. Newton. An improvement applicable to rolls for rolling iron or other metals. A communication.
2324. W. E. Newton. Improvements in clocks or timekeepers. A communication.
2329. P. A. Lecomte de Fontainemoreau. Improvements in doors. A communication.
2349. L. L. H. Bertou. Improvements in the manufacture or production of ornamental wrappers or packings for fabrics or other goods.
2371. C. Lungley. Improved apparatus for directing, signalling, and indicating on board ships or vessels or other places.
2378. J. Leeming. Improvements in looms for weaving.
2382. W. Jenkins. Improvements in the furnaces or fire boxes of locomotive boilers to adapt them for the consumption of coal and the smoke arising therefrom.
2383. A. Gray. Improvements in the picking motion of power looms.
2386. A. Gray. Improvements in lubricating mechanism.
2391. G. J. Bensen. An improvement in drying sugar.
2403. W. Middleton, jun., and T. T. Chellingworth. Certain improvements in adjusting the sliding parts of chandeliers and gas pendants.
2407. E. Alcan. An improved process for refining paraffine. A communication.
2424. R. Watson. Improvements in the manufacture of heddles or healds for weaving.
2430. T. Webster. Improvements in the permanent way of railways. A communication.
2432. H. Bessemer. Improvements in the manufacture of cast steel.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2109. Thomas Sherriff.
2118. William Tatham.
2123. William M'Naught.
2131. William Peel Gaulton.
2140. William Bridges Adams.
2145. Thomas Bennett.
2228. Ernst Gessner.

LIST OF SEALED PATENTS.

Sealed September 29, 1857.

1122. Edwin Marten.
1141. George Welch.
1187. Thomas Dickason Rotch.
1337. Thomas Lambert and Obed Wakefield.
1409. John Watson Burton and George Pye.
1420. Laurent Lethuillier.
1428. Edward Curtis Kemp.
1542. Louis Laurent Bequemie.
1749. Richard Shaw and John Robinson.
1802. Stanislas Gaudrion.
1909. John Scott Russell.
1924. William Edward Newton.
1927. Webster Woodman.
1968. Gavin Walker and James Clachan.
2012. William Edward Newton.
2075. William McKinley and Robert Walker.
2077. John Frearson.

Sealed October 2, 1857.

927. Richard Archibald Brooman.
939. Elkan Adler and Francis Barber Howell.
966. Charles Goodyear.
972. James George Hunt.
976. John Robinson.
980. Henry Brierly.
1000. Thomas Rolfe.
1072. John Sudbury and Alfred William Linsell.
1114. William Edward Newton.
1134. Robert Taylor, Richard Worswick, and John Lovatt.
1176. William Pickstone.
1180. Charles Cowper.
1226. James Anderson.
1290. Richard Bennett.
1296. William Smith.
2002. William Edward Newton.
2062. John Clay.

Sealed October 6, 1857.

973. John Talbot Pitman.
977. Edward Finch.

984. Robert Kanzow Bowley.
985. Benjamin Hingley and Samuel Hingley.
989. Edmund Edwards and Edward Beacher.
992. Jasper Wheeler Rogers.
1003. Edwin Powley Alexander.
1010. John Leach.
1011. John Beech and John Williams.
1036. Thomas Richardson and Edmund John Jasper Browell.
1068. James Payne.
1081. Johnson Hands.
1126. James Sharples.
1128. Thomas Burton and Simeon Lord.
1189. Julien Billiard.
1330. Peter Armand Lecomte de Fontainemoreau.
1615. William Edward Newton.
1686. Joseph Ellis.
1694. James Heywood Whitehead.
1723. Edward Vincent Gardner.
1772. John Henry Johnson.
1882. Peter Armand Lecomte de Fontainemoreau.
1953. Frederick Crace Calvert and Charles Lowe.
2015. James Hall.
2097. Thomas Rickett.
2126. Thomas Lawley.
2131. Alfred Vincent Newton.
2133. William Irving Holdsworth.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1784.] SATURDAY, OCTOBER 17, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

DE BERGUE'S IMPROVED PERMANENT WAY, AND APPARATUS FOR LAYING PERMANENT WAY.

DE BERGUE'S IMPROVED PERMANENT WAY, AND APPARATUS FOR LAYING PERMANENT WAY.

Mr. C. De Bergue, whose mechanical inventions are to a great extent well known, has recently laid down on the South Western and other railways an improved permanent way. This way is constructed with a rail of the American or German section. The bearers or sleepers employed are of cast iron, and of a form arrived at after a series of most carefully-made experiments. The bearer or sleeper is fastened to the rail by means of a clamp fixed down by a bolt and nut, and similar means are employed to secure the ties which occur at every alternate pair of bearers or sleepers. The tires are of wrought iron, cut by machinery to fit the castings, so that the gauge of the road is formed and maintained with accuracy. The rails are fished at the joints, and the whole of the parts are easy to handle and put together.

A machine is used in laying the road, as shown in the annexed engravings, consisting of a light truck or carriage, upon which seats are formed to receive the sleepers, rails, and ties for one pair of rails; these, being then fastened and bolted together, are lifted above the truck by a simple apparatus; the truck is then moved forward, the pair of rails, with its appurtenances, is lowered into its place, and the joints fished to the preceding pair. By

Fig. 3.

these means 120 yards can, it is said, be laid per hour, at less than one-fourth of the cost of laying permanent way by the ordinary method. Fig. 1 is a side elevation, fig. 2 a plan, and fig. 3 an end view of the machine. A is the truck; B B are the moveable windlasses, with chain and clasps to raise up the sleeper and rail when fastened together; C is the position of sleepers and rails when laid on the truck; D is the position of the sleepers, rails, &c., as raised up with the windlasses after being bolted together prior to removing the truck.

The improved permanent way has been employed on the following railways:—Lancashire and Yorkshire; London and South Western (main line and Windsor line); Barcelona and Martorell; Grao de Valencia and Almansa; and others. Half a mile of it is laid upon the down line of the Richmond branch on the London side of the Wandsworth station. It has been highly spoken of by the engineers of the various lines on which it is laid.

JEREMIAH HORROCKS, THE LANCASHIRE ASTRONOMER.*

BY T. T. WILKINSON, ESQ., F.R.A.S., &c., &c.

The fame of Jeremiah Horrocks does not rest solely on his having been the first to announce and observe the transit of Venus over the sun's disk. He appears to have been well versed in all that relates to astronomy, both theoretical and practical; and his talents must have developed themselves early, for he was curate of Hoole at about twenty-one years of age, and was sent to Emmanuel College, Cambridge, when only fourteen. What he did was therefore done during his leisure hours when either preparing for, or actually engaged in, the ministry; hence our regret that he should have been cut off so early in life, just when his circle of acquaintance was increasing,

* The above article, by our old and valued correspondent, has been written in consequence of a proposal that has recently been made to erect a monument to the memory of Horrocks.—Eds. M. M.

his chances of worldly prosperity becoming more favourable, and when he had given proofs of being able to do so much for his favourite science. On his entering college, he states that he took great delight in studying the works of Tycho Brahè and Kepler, and was anxious to become acquainted with the causes of the motions of the heavenly bodies, their eclipses and occultations. An examination of the tables of Lansberg and Kepler enabled him to predict the transit of Venus, and he made several near approaches to the Newtonian theory of the universe. "In the lunar theory," says Mr. Grant, "he effected an improvement which would alone suffice to obtain for him an imperishable renown. His beautiful explanation of the inequality in the moon's longitude, termed the evection, by means of a libratory motion of the apsides and a variable eccentricity, was the last great step made in the development of the laws of the planetary movements previous to the establishment of the theory of gravitation by Newton." In his letter to Crabtree "he ascribes the motion of the lunar apsides to the disturbing force of the sun," and he illustrates the motions of the planets, by causing a pendulum to move in an ellipse subject to a slight tangential impulse; an experiment which Dr. Hooke repeated before the Royal Society, "about thirty years after Horrocks had devised it," and which has generally been known as Hooke's experiment. His views on the planetary motions were much in advance of his age. He had sagacity enough to correct Kepler, when that philosopher fell into error, and, had his life been spared, he would have proved himself a worthy successor to that great astronomer. From other letters, it appears that Horrocks had formed "a distinct perception of the famous inequality in the mean motions of Jupiter and Saturn, arising from their mutual disturbance." He very nearly determined the true acceleration of Jupiter, and even hinted at the possible periodicity of the phenomenon. The retardation of Saturn's mean motion did not escape him; he prided himself on being the first to notice it, and requested his friend Crabtree "to watch the phenomenon carefully, by making constant observations of the planet."

In 1638 his attention was turned to the investigation of the nature and motions of comets. It appears that he considered them to be projected from the sun; and he traced the comet of A.D. 1577 by making it to return to that body in very nearly an elliptical figure. Dr. Wallis made a special request to the Royal Society that this paper in Horrocks's own handwriting should be preserved. The theory of the tides next engaged his thoughts, and, in the true spirit of the Baconian philosophy, he proposed that experiment should aid his observations. At the time of his death he had deduced many interesting particulars; he found the tides "withal very regular, although subject to many strange inequalities hitherto remarked by no other person;" and hoped by continuing the observations another year "he should obtain some valuable results." During this course he did not neglect astronomy, for one of his latest letters is to Crabtree, in which he requests his friend to obtain for him some of Gascoigne's measurements of the lunar diameter; but "ere another month had elapsed, his noble spirit had fled from its mortal tenement."

Of William Crabtree, the clothier at Broughton, we know but little. Many of his observations of the planets are printed by Dr. Wallis in the posthumous works of Horrocks, and he appears to have been on intimate terms with both Gascoigne and Towneley. It is certain that he did not survive his friend Horrocks more than a few months, and one authority states that "he is supposed to have perished in the civil wars." His visits to Yorkshire may have led to his joining the army, and hence the probability that he perished on the field of battle.

William Gascoigne, of Middleton, in Yorkshire, was the earliest inventor of the micrometer. He showed both the instrument and its uses to Crabtree, on the occasion of his journey to Yorkshire in A.D. 1639; and he determined by its means "the value of the lunar parallax," both when "she was in the horizon, and again when she was on the meridian." His celestial observations are still in existence, from which he appears to have used the micrometer in several delicate measurements; and Flamstead, in the "Historia Celestis," has inserted a series of observations extending from A.D. 1638 to A.D. 1643, which were made by Gascoigne and his friend Crabtree; the former using the micrometer whenever required. Mr. Grant, in his "History of Physical Astronomy," gives several comparisons between Gascoigne's measures of the semi-diameter of the sun and those of the present day in the "Connaissance de Temps," from which it follows that the original inventor brought his instrument to considerable perfection. He had also prepared a "Treatise on Optics" for the press, but death, at the battle of Marston Moor, put an end to his labours and his life. What became of the manuscript treatise is not known; but tradition states that it was burned at his father's house "by a party of marauding soldiers."

Richard Towneley, of Towneley Hall, near Burnley, was also one of the ablest philosophers and mathematicians of his time. He proposed several difficult problems in trigonometrical surveying, one of which is still known as Towneley's Problem; and Professor Oersted, of Copenhagen, states in the "Philosophical Magazine" for August, 1826, that he was the first to deduce the well-known law for the expansion of gases, from some experiments made by his friend, the Hon. Charles Cavendish, which has since been generally but unjustly known as "Marriotte's Law." He improved the wire micrometer invented by Gascoigne, and defended its inventor against the subsequent claims of Auzout, a noted French philosopher, who also had been led to construct a similar instrument. Some of his papers were contributed to the "Philosophical Transactions," and others are included in "Leigh's Lancashire." My copy of the "Mathematical Collections of Pappus," contains his book-plate on the title page, and no doubt once belonged to this distinguished neighbour. His epitaph in the Towneley Chapel, at Burnley Church, declares his love for pure geometry; and it is much to his credit that, after his father's death at Marston Moor, he preferred literature and science to the perils of war, and lived to the good old age of 78.

Such are a few of the labours of this band of northern astronomers, and such this imperfect *resumé* of their principal labours. It is proposed to erect a suitable memorial to the memory of the principal personage in the group, Mr. Jeremiah Horrocks, the hardworking curate of Hoole; and everyone interested in the subject will now be prepared to admit that a strong case for such a work of remembrance has been satisfactorily produced. Mr. Brickel's "Appeal to the men of science throughout the kingdom, and more especially to the inhabitants of Lancashire," is being distributed by his committee, and nothing remains but to respond to the laudable project of erecting a memorial to Horrocks and publishing the remains of one of Lancashire's most gifted sons.

Burnley, October 5, 1857.

THE WESTMINSTER BELLS.—Our readers will be interested to know that all the Westminster quarter bells are now cast. The notes are B, E (the octave above the great bell), F sharp, and G sharp. The B bell weighs about four tons, and the other three together a little more than four tons, so that the whole peal, including the great bell of nearly sixteen tons, weighs as nearly as possible twenty-four tons, as originally estimated. If the tower and the iron beams are ready for them, they may be taken up in the course of the next month, and the clock is ready to follow them.

ON THE ELECTRO-DYNAMIC INDUCTION MACHINE.*

BY PROFESSOR CALLAN, OF MAYNOOTH.

AFTER stating that he had discovered the induction coil in 1836, that in 1837 he had devised an instrument for getting a rapid succession of electrical currents from the coil, and that thus he had completed the coil in 1837, as a machine by which a regular supply of electricity might be furnished, Professor Callan said that he would lay before the Association the results of a long series of experiments on the induction machine. The first of these results is a means of getting a shock directly from the armature of a magnet at the moment of its demagnetization, by using, not a solid piece of iron, but a coil of very fine insulated iron for the armature of an electro-magnet, between the poles of which the coil would fit. When the helix of the magnet is connected with a battery, the armature is magnetized on account of its proximity to the magnetized iron; and when the battery connection is broken, if the ends of the insulated iron wire be held in the hands, a shock will be felt. The second result is the discovery of the fact, that if iron wires be put into a coil of covered copper wire, the ends of which are connected with a battery, and if another coil be connected with the same battery, the quantity of electricity which will flow through the latter will be greater when the first coil is filled with iron wires than when they are removed. The third result is, a core used in the primary coil, which consists of a coil of insulated iron wire, and which has five advantages over all the cores in common use. First, there is no complete circuit for any electrical current excited in any section of the core, because all the spirals of the coil are insulated from each other, and no spiral returns to itself. In the common cores, even when the wires are covered with thread, there is a complete circuit for every current induced in each section of every wire. Secondly, the currents in the various sections of the iron do not oppose each other; but the currents in each section of every wire are opposed by the currents flowing in the surrounding wires. Thirdly, in the iron coil all the currents in the various spirals flow in the same direction, and form one strong current, which may be used by connecting the ends of the coil with any body to which we wish to apply its force. But in the common cores all the currents in the sections of each wire remain within the wires, and cannot be used. Fourthly, the effect of the condenser on the currents produced in the iron core

* British Association, 1857.

can be ascertained when an iron coil is used, but not with the common cores. By using an iron coil as a core, it is found that the condenser increases the intensity of the currents induced in the core. Fifthly, the ends of the iron coil, used as a core, may be connected with the coatings of a Leyden jar, and then the sparks from the coil are diminished in length, but increased in brightness. By the use of cores consisting of coils of insulated iron wires, electrical currents of considerable quantity and intensity may be obtained. These currents of quantity and intensity may answer for working the Atlantic telegraph, and for producing the electric light. Besides the cores just described, and the common core, Professor Callan used three other kinds of cores: viz., a flat or elliptical bundle of wires; a core made by coiling uninsulated iron wire on an iron bar; and a core consisting partly of a bundle of iron wire, and partly of a coil of insulated iron wire. The fourth result of his experiments is a new mode of insulation, in which imperfect insulation is used when imperfect insulation is sufficient, and perfect insulation is employed where such insulation is required. The advantage of this mode of insulation is, that each spiral in the secondary coil is brought nearer to the other spirals, as well as to the primary coil and core, than it can be in the common method of insulation, without at all diminishing the efficiency of the insulation. A coil in which the secondary wire was iron, and insulated in the manner described, was shown to the meeting, which, with a single cell, 6 inches by 4, gave sparks half an inch long without a condenser. The insulation of the large condensers made by Professor Callan, in which the acting metallic surface of each plate exceeded 600 square feet, gave way before the coil which he exhibited was made; and, therefore, he could not say what the length of the sparks would be with the aid of a condenser. But were a condenser of the proper size to have the effect of increasing the sparks in a thirty-fold ratio, as in M. Gassiot's great coil, the length of the sparks produced by Professor Callan's coil with a single cell should be 15 inches. The outer diameter of the coil was about 4 ins., its length 20 inches, and the length of the secondary coil about 21,000 feet. The fifth result is, a contact-breaker in which the striking parts are copper, and which acts as well as if they were platina. The sixth result is a mere explanation of the condenser, which is confirmed by the effect of the condenser on the electrical currents produced in the core. The last result consists in the discovery of some new facts relating to the condenser, from some of which it follows, that the ordinary mode of making the condenser is defective; for condensers are generally made so that the entire surface of each of the metallic plates must act. But the condenser for every coil should be constructed in such a way that a small, or a considerable part, or the whole of the surface of each plate may be applied to the coil. For a large condenser which would make the effect of a coil excited by a single cell less than it would be without a condenser, will increase the effect of the same coil when it is connected with a battery of ten or twelve cells.

RITCHIE'S ELECTRO-DYNAMIC INDUCTION MACHINE.*

BY PROFESSOR W. B. ROGERS.

A very powerful induction apparatus has been devised by Mr. E. S. Ritchie, of Boston, United States. In this the secondary coil is formed by winding the wire in such manner as to make a series of flat spirals, having each the thickness of a single wire, and thus building up the coil by thin transverse strata. The primary coil is covered by a gutta percha tube, and this by a closely fitting bell glass, knobbed at the upper end, and having a widely-expanded lip below. Over the whole is placed the secondary coil. By this arrangement the discharge between the core and the secondary coil is effectually prevented. Very perfect means are used for preventing any discharge within the secondary coil, between its different parts. With a secondary coil of 30,000 feet of wire, No. 34, and using one Bunsen cell, this apparatus gives a spark six inches in length. When the coil is increased to 50,000 or 60,000 feet, and four cells are used, the spark is lengthened to upwards of ten inches, and has been passed continuously through an interval of 10¼ inches. The primary coil is formed of No. 9 wire, and about 80 feet in length. The condenser, made of tinfoil separated by oiled silk, has a surface in this larger apparatus of about 30 feet. Professor Rogers referred to the very superb phenomena produced by the passage of the current through an exhausted tube of great length and diameter, and those exhibited by the beautiful arrangement known as Gassiot's Cascade, which, with other phenomena of electrical light, were developed by this apparatus with a splendour perhaps never before equalled.

* British Association, 1857.

IMPROVEMENTS IN GROVE'S BATTERY.*

BY PROFESSOR G. J. STONEY.

PROFESSOR STONEY first exhibited a few cells of Grove's battery in the ordinary way in which the plates of zinc and platina are arranged; if any accident occur to any one cell or plate it cannot be removed from the battery without taking down, cell by cell, the whole system that precedes it. Much inconvenience, also, is experienced from the fuming of the acids when the operator has finished his day's work, and in taking the plates in the ordinary manner each out of its place, and dipping it into water. In the improvement which Professor Stoney has devised, stout iron wires are bent into the form ᔕ 123. To 1 and 2 plates of zinc are soldered, and to 3 a plate of platina, and so on with each of the rest of the elements. He had feared there would be much difficulty in soldering the platina plate to the bend of the iron wire 3, but it was found not to be so, as upon dipping the iron into chloride of zinc, and then laying the platina plate against it, it was found that the soldering iron, with a small globule of solder, made a perfect joint along the entire extent. To prevent any chance contact of the wire 3 with 1 or 2 of the next element, a little cylinder of gutta percha was put over each of these wires 3 which carried the platina plate. In putting the elements of the battery together, the platina plate 3 of each element was simply inserted between 1 and 2 of the next element, and so on throughout, and each element was then perfectly distinct from every other, and could be taken out or put in, or the cells belonging to it rearranged as to charge of acids or otherwise, as occasion might arise, without interfering with the rest. When it is desired to stop work, the whole of these ᔕ formed wires, with the zinc and platina plates attached to them, are lifted together out of their cells by an oblong mahogany frame, one side of which slides in a groove, so that the sides at first are at a sufficient distance to go over the entire system of ᔕ's, one side of the frame is then brought under one line of the bends of the wires, and the moveable side is then pushed in so as to come under the bends on the opposite side; the entire frame is then lifted with all the plates at once, and they are all plunged together into a trough of water placed near. Thus the fuming is almost entirely avoided.

* British Association, 1857.

BEAUFUMÉ'S GAS-FLAME FURNACE.

M. GUESNET, Admiralty Engineer, and M. Sochet, Director of Naval Construction, both of Cherbourg, France, have made a report upon a gas-flame furnance, the invention of M. Beaufumé, from which we condense the following information:

In accordance with an agreement dated 23rd Feb., 1856, M. Beaufumé delivered at the port of Cherbourg a heating apparatus constructed according to his new system. This apparatus has been applied to the boiler of the Northern Forge at that port, where experiments were made with it.

Instead of burning the fuel directly below the boiler, M. Beaufumé first transforms it into gas in a separate apparatus; and then conveys this gas to the boiler, where its complete combustion causes the generation of the steam. This separate apparatus, which M. Beaufumé terms a gasifier, consists of a furnace constructed very like that of a locomotive, with a water-space substituted for the tube-plate. Coal is heaped upon the fire bars to a considerable height; say 20 to 28 inches, according to the quality of the coal. The air necessary for the gasification is supplied in suitable quantities below the fire bars, by means of a blowing fan. The oxygen of the air supplied causes very active combustion amongst the lower layers of coal in contact with the fire bars, converting the coal into carbonic acid gas; and this gas in passing through and amongst the upper layers, which ought always to remain black, becomes converted into carbonic oxide and accumulates in the upper part of the furnace mixed with nitrogen, and doubtless hydrogen also. These gases, the temperature of which is but slightly elevated, are conducted to the boiler through a wrought iron pipe, and enter the boiler furnace after having been thoroughly mixed, in a chamber termed the burner, with a suitable proportion of air supplied by the blowing fan. After having been once ignited in the boiler furnace, the gases continue to burn as fast as they are supplied. The flames produced act on the heating surface of the boiler; and the gases remaining after combustion pass through the flues and escape into the atmosphere under the pressure due to the blowing fan, no chimney being required.

The gasifier, in consequence of the water space with which it is surrounded, is itself a small boiler, the water in it absorbing the heat developed in the gasifying process, and utilizing it by forming a considerable quantity of steam, which is added to that of the large boiler. The furnace of the gas-

ifier is supplied with fuel through a passage in the top of the apparatus, this passage crossing the steam space and opening into the furnace, whilst it is fitted with doors or valves at both extremities, so that the fuel can be introduced into the furnace without opening a communication with the atmosphere.

A few simple and inexpensive alterations require to be made in the brickwork setting of ordinary boilers in order to adapt them for being heated by gas. The fire bars being removed, a brickwork platform is constructed in their place, and on this platform a number of brickwork passages are formed, with openings arranged to allow a portion of the ignited gases to come directly into contact with the boiler surface. These passages are quite indispensable, and form what may be called a heat regulator. They heat the gases, which arriving in too cold a state would not be completely burnt did they not come in contact with highly heated surfaces before being ignited.

The boiler of the forge is of 12 horses power; it has a total heating surface of 167½ square feet, and when arranged in the ordinary way, it has a grate surface of 12¼ square feet.

The gasifier supplied by M. Beaufumé has a grate surface of 5¼ square feet, and a depth of fuel of 27½ inches can be placed in it. The total height of the apparatus, including the ash-pan, &c., is 11½ feet; and, taking extreme external measurements, the space occupied amounts to 290 cubic feet. To place the apparatus, and to allow sufficient room for attending to it, a space measuring at least 10 feet by 6½ feet is required, without including that taken up by the blowing fan and the donkey engine which drives it. The cylinder of the donkey engine is 3·9 inches diameter, and the stroke 7·9 ins.: whilst the maximum speed is 170 revolutions per minute with a pressure of 5 atmospheres, the blowing fan being made to turn at the rate of 1,000 revolutions per minute, by a belt and pulley. The blowing fan is 2 feet in diameter by 1 foot in width, and the pressure of the blast produced when the fan makes 1,000 revolutions per minute is equal to a column of water 1·97 inches high.

The Beaufumé apparatus requires more attention, and gives perhaps a little more trouble than an ordinary boiler: still an ordinary fireman is quite capable of attending to it.

When the boiler and gasifier are cold, that is, when the fire has been extinguished for more than twelve hours, it requires considerably more time to get up the steam than with the ordinary furnace—about 25 minutes. At the same time, when the fire in the gasifier can be kept in during the intervals between working hours, as M. Beaufumé proposes, this inconvenience does not exist.

The Beaufumé apparatus has also another inconvenience which is felt every time the fuel is stirred. This operation necessitates the opening of small apertures for the introduction of the poker, permitting large quantities of carbonic oxide to escape, the presence of which in the boiler house is injurious to the fireman, unless the atmosphere is renewed with sufficient rapidity.

Finally, there are miniature explosions which take place on igniting the gases in the boiler furnace, when the precaution is not taken of shutting off the supply of air until the moment when the light is applied, and when in consequence the furnace and flues are filled with carbonic oxide mixed with air. There is, however, not the slightest danger attending these explosions.

In order to obtain a standard for comparison, preliminary experiments were made with the boiler heated by the ordinary furnace, to ascertain what quantity of steam per lb. of coal could be raised under these circumstances. The brickwork was in rather a bad condition, and only 4·85 lbs. of water were converted into steam of a pressure of 5 atmospheres per lb. of Newcastle coal.

When employing the same coal, on applying the Beaufumé apparatus, the quantity of water converted into steam of a pressure of 5 atmospheres per lb. of coal, which was increased at each experiment in consequence of repeated improvements in the working of the apparatus finally reached 8·26 lb. This shows that the Beaufumé apparatus realizes a saving in fuel of 41 per cent. in the production of a given amount of steam. It is, however, necessary to make a deduction for the steam used by the donkey engine driving the blowing fan, which reduces it to about 7·8 lbs., a result which still shows a saving of 38 per cent.

In these two series of experiments the production of steam was estimated by the quantity of feed water used—doubtless a very imperfect method—but the only one at command.

During the whole of the experiments with the apparatus the consumption of smoke was complete, a very light smoke only being seen to issue from the chimney when the fuel was stirred, caused by the temporary production of an excess of gas compared with the air supplied. This smoke was almost imperceptible, and moreover lasted but for an instant.

During this series of experiments it was ascertained that the temperature of the residuary gases on leaving the flues was still sufficiently high to melt zinc; there was, therefore, undoubtedly, a considerable loss

of heat, as these gases should not have had a temperature of more than 150° Centigrade (302° Fahr.) This arose in consequence of the heating surface being insufficient.

Further experiments were made with the Beaufumé apparatus, but with other than Newcastle coals, in all cases giving very advantageous results.

ALLEN AND YOUNG'S IMPROVEMENTS IN PREVENTING OSCILLATION IN CARRIAGES UPON RAILWAYS.

Mr. J. Allen, and Mr. J. Young, both of London, and both possessing a good practical knowledge of railways, have just brought forward an invention designed to prevent oscillation in carriages on railways. Their invention consists in forming and fitting the face plates of buffers for railway carriages in such manner that, when the plates on the ends of the buffers of adjacent carriages are brought together, the lateral motion of one past the other may be prevented, while at the same time no obstruction shall be offered to the motion of a train composed of carriages thus fitted round curves. Their invention may be carried into effect in several ways: First, the plate on one buffer may be formed with a spherical or other projection, and the plate on the buffer which comes opposite to it with a spherical or other recess, into which the aforesaid projection will take when the two buffers are brought together. Secondly, each of the plates may be formed with a spherical or other recess, and a sphere, or cylinder, or other body be suspended from, or attached to the buffer, in such manner that when the said sphere, cylinder, or other body is suitably placed, it may, on the buffers coming together, lie partly in the recess of each plate; or any other equivalent arrangement may be adopted. Any such arrangement will prevent the lateral motion above referred to, and at the same time will allow the buffer plates to incline themselves to each other in passing round curves, if the projection, or sphere, or other body be made of somewhat greater diameter than the recess into which it lies when in use. The

Fig. 1.

Fig. 2.

Fig. 3.

annexed engravings illustrate the manner in which the invention is carried into effect under the first form. Fig. 1 is a plan of a hollow or concave buffer-head; fig. 2 is an edge view of the same, partly in section, and fig. 3 is a similar view of a corresponding railway convex buffer head, not in section. A, is the buffer head covered with a plate of iron, B, which plate is made concave on one side and convex on the other (cymbal shaped). This plate is attached to the buffer head, A, with the hollow or concave side, *a*, outwards. A similar plate, C, is attached to the opposite buffer head, D, but having its convex face, *b*, outwards; the convex part, *b*, of this plate is made of such a size as to enter freely into the concave recess, *a*, in the plate, B, which is attached to the buffer head, A; E, E′ are the buffer rods. When carriages thus fitted are screwed up together for a journey, the projection, *b*, enters the recess, *a*, and thus their tendency to oscillate independently will be resisted.

LAMING'S IMPROVEMENTS IN PURIFYING GAS.

MR. R. LAMING, of Hayward's Heath, Cuckfield, Sussex, in the specification of a recent patent, claims the following "improvements in purifying gas, in obtaining materials useful for that purpose, and in working up into useful products certain ammoniacal and phosphatic substances obtainable as residues in the purifying of gas," viz.:—Distilling phosphorus from earthy compounds or mixtures containing phosphate of ammonia and carbonaceous matter. The combination of means described for obtaining simultaneously from the residue of the purification of gas by solution of sulphate of iron two products, namely, sulphate of ammonia and hydrated peroxide of iron in a state of admixture with lime, magnesia, carbonate of lime, or carbonate of magnesia, or any two or more of them. Obtaining ammonia, and simultaneously combining it with the carbonic acid of impure gas, by introducing hydrosulphate of ammonia into the gas prior to or simultaneously with its entrance into dry purifiers charged with materials containing iron in any state which enables it to abstract the sulphuretted hydrogen, and to undergo atmospheric revivification alternately with the subsequent removal from the gas of its ammonia and combined carbonic acid; (but the patentee does not claim the washing or scrubbing of impure gas with the ordinary gas liquors as practised for the purpose of making them more rich in ammoniacal compounds, even though the gas be afterwards passed through a material containing hydrated or revivifiable peroxide of iron). Converting solutions containing in large or small quantities an ammoniacal hydrosulphate, mixed or not with ammoniacal carbonate, into solutions either wholly or in part of free of caustic ammonia, by the agency of such oxides, or preparations, or mixtures containing chemically divided iron as will abstract the sulphuretted hydrogen without saturating or fixing the bulk of the ammonia, also admitting water to watery solutions to drench what are known in gas works as porous mixtures of hydrated or reviviable peroxide of iron while in the purifying vessels, preparatory to forcing through those vessels a current of air for the revivification of the purifying material which they contain. The purification of gas from ammonia or ammoniacal compounds by washing it in a scrubber divided by one or more double diaphragms, each so constructed that its lower part is a basin to sustain the acting liquid into which the upper and perforated part of the double diaphragm is immersed for distributing the liquid and the gas. Receiving the volatile products distilled from gas liquor or ammoniacal washings into a close vessel containing sulphate of iron in solution, together with either the subsequent separation and evaporation of the resulting liquor into sulphate of ammonia, and the mixture and peroxidation of the iron precipitate, or the evaporation by gentle heat of the mixed products of the distillation.

HOUDIN, THE FRENCH MECHANIC, MATHEMATICIAN, AND WIZARD.

THE Paris correspondent of the *Times* gives the following account of the famous Houdin:—"Every one has seen or heard speak of the great Robert Houdin. Besides being the prince of conjurors, he is an able mathematician and mechanician, and his electric clock, made for the Hotel de Ville of his native town of Blois, obtained a medal at the Paris Exhibition. It is not generally known that he was sent to Algeria by the French Government on a mission connected with the black art—probably the first time that a conjuror has been called upon to exercise his profession in government employ. Some details of his expedition have just been published. Its object was to destroy the influence exercised among the Arab tribes by the marabouts, an influence often mischievously applied. By a few clumsy tricks and impostures these marabouts pass themselves off as sorcerers; no one, it was justly thought, was better able to eclipse their skill and discredit their science than the man of inexhaustible bottles. One of the great pretensions of the marabout was invulnerability. At the moment a loaded musket was fired at him, and the trigger pulled, he pronounced a few cabalistic words and the weapon did not go off. Houdin detected the trick, and showed that the touchhole was plugged. The Arab wizard was furious and abused his French rival. 'You may revenge yourself,' quietly replied Houdin; 'take a pistol, load it yourself; here are bullets, put one in the barrel, but before doing so mark it with your knife.' The Arab did as he was told. 'You are quite certain now,' said Houdin, 'that the pistol is loaded and will go off. Tell me, do you feel no remorse in killing me thus, notwithstanding that I authorise you?' 'You are my enemy,' coldly replied the Arab; 'I will kill you.' Without replying, Houdin stuck an apple on the point of a knife, and calmly gave the word to fire. The pistol was discharged, the apple flew far away, and there appeared in its place, stuck on the point of the knife, the bullet the marabout had marked. The spectators remained

mute from stupefaction; the marabout bowed before his superior; 'Allah is great!' he said, 'I am vanquished.' Instead of the bottle from which, in Europe, Robert Houdin pours an endless stream of every description of wine and liqueurs, he called for an empty bowl, which he kept continually full of boiling coffee, but few of the Arabs would taste it, for they made sure that it came direct from the Devil's own coffee-pot. He then told them that it was in his power to deprive them of all strength, and to restore it to them at will, and he produced a small box, so light that a child could lift it with its finger; but it suddenly became so heavy that the strongest man present could not raise it, and the Arabs, who prize physical strength above everything, looked with terror at the great magician who, they doubted not, could annihilate them by the mere exertion of his will. They expressed this belief; Houdin confirmed them in it, and promised that, on a day appointed, he would convert one of them into smoke. The day came, the throng was prodigious; a fanatical marabout had agreed to give himself up to the sorcerer. They made him stand on a table and covered him with a transparent gauze; then Houdin and another person lifted the table by the two ends, and the Arab disappeared in a cloud of smoke. The terror of the spectators was indescribable; they rushed out of the place, and ran a long distance before some of the boldest thought of returning to look after the marabout. They found him near the place where he had been evaporated; but he could tell them nothing, and was like a drunken man, ignorant of what had happened to him. Thenceforward Houdin was venerated and the marabouts were despised; the object of the French Government was completely attained."

A Practical Treatise on Cast and Wrought Iron Bridges and Girders, &c., &c. By W. Humber. Parts ix.—xxii. London: E. and F. Spon, Bucklersbury.

Having repeatedly pointed out the peculiar features and merits of this work, it is unnecessary for us to do more than occasionally revert to its progress. In the parts before us, we have illustrated detailed descriptions of numerous railway bridges, the bridge across the Thames at Chelsea, fireproof floors, and other structures of a similar character. The practical details given are invaluable to every intelligent engineer. In a recent number of the work, we observe with pleasure the following notice, announcing a contemplated extension of the work:—"In entering upon this publication a pledge was given that the number of parts should not exceed twenty-four. But it soon became manifest that within such narrow limits it was impossible to do proper justice to a subject which is becoming every day of more importance. To obviate the difficulty, it is intended to bring forward a second series on the same subject, introducing such modifications in the plan, and making such alterations as previous experience may have pointed out. In this second attempt it is intended that every description of iron bridge, having been properly classed, shall be reviewed in succession, and illustrated by examples carefully selected for the purpose. It is further intended that the whole shall be preceded by an essay on the strength of iron, both wrought and cast, with a general review of the laws by which the stability of iron bridges are governed. In this part, the numerous experiments and interesting researches which have been made of late years on this subject will be carefully condensed, and the results, wherever practicable, collected together in tables for easy reference. The whole of the plates will be drawn with the greatest attention to accuracy, and amongst the designs will be found some of the finest engineering structures which have been erected of late. Besides these plates, numerous woodcuts will be interspersed through the text."

The Art of Double-Counting on the Lathe, whereby a Variety of Patterns, in the form of Ellipses, Triangles, Squares, Pentagons, Hexagons, and Octagons, 3, 4, 6, and 8-Looped Figures, besides others of a more complex character, may be produced by means of the Division-plate and the Eccentric and Elliptical Cutters, with Sixty Illustrations. By Captain James Ash, late of the Bombay Artillery, inventor of the elliptical cutting-frame. London: L. Booth, 307, Regent-street. 1857.

We cannot better indicate the character of this work than by quoting the following words from the commencement of it. "Some years ago I obtained," says the author, "a copy of Mr. Ibbetson's work on the Double Eccentric Chuck which he had invented; and while studying the construction of that instrument, it struck me that a large number of the patterns which it produced could be performed with the common (or single) *eccentric chuck*, if the *eccentric cutter* were used instead of the *fixed tool*, and if the *division-plate* of the lathe and the wheel of the *eccentric chuck* were *counted together* in a fixed ratio for each cut, while the eccentricity and the

position of the cutter-tool were obtained on the *eccentric* chuck and the slide-rest.

"In order to carry out this idea, I procured a flat brass ring, divided into 96 divisions (that being the number of divisions on my eccentric chuck-wheel), and fixed it temporarily *over* the brass *division-plate* of my lathe; and I soon found that, by obtaining the required eccentricity on the eccentric chuck, the required position of the cutter-tool on the slide-rest, and by counting both on the division-plate, and on the eccentric chuck-wheel, in certain ratios for each cut, I could produce a variety of patterns, in the form of ellipses, triangles, squares, pentagons, hexagons, and octagons. As minute explanations of every part of the process will be given in the body of the work, it will be enough to observe here, that the adjustments of the eccentric chuck and slide-rest, when once made, never require to be again altered while the pattern is being cut; and *after* these adjustments *have* been made, nothing requires to be done to count *double* for each cut."

We will only add, that the technical directions given by the author for the production of designs are in ample detail, and that many of the patterns are of an exquisitely beautiful character. The work has been "got up" with great care.

Mensuration, Plain and Solid: For the Use of Schools and Colleges, Civil, Military, and Naval; and specially adapted for Self-instruction. By the Rev. J. Sidney Boucher, M.A. London: Longman and Co., 1857.

This little work, by the Principal of the Holly Bank School, Birkenhead, is designed to supply, in a simple form, a knowledge of the rules of mensuration, and is admirably adapted to fulfil its design. There is really no mystery in the greater part of these rules, and, as Mr. Boucher shows, any intelligent person who is capable of following a few plain consecutive steps of reasoning, may easily acquire the whole art. If there should be any one among our readers who is unacquainted, or but partially acquainted, with the very useful processes of measuring the dimensions of the various bodies by which he is surrounded, we recommend him to study this little book for a week or two, and solve a tithe of the 1500 examples given in it, and he will then find himself perfectly master of the principal rules of mensuration.

THE WAVE-LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Your correspondent, Mr. Cheverton, in No. 1783, makes the following astounding assertions:—*That it is a fallacy that we can obtain increased speed without an increased expenditure of power;* and that *no alteration in the construction or form of a vessel will enable us to obtain additional speed without additional power.*

Let Mr. Cheverton put a strong man in a circular washing-tub on the Thames, and a boy in an outrigger wager boat, and give the boy 56 lbs. of paving stones in his boat to make his displacement equal to the tub. Let them do their best with a pair of sculls each, and the boy will go five miles to the man's one. If I call the man's power two and the boy's one, we shall have one doing five times the work of two, owing to the *form* of the vessel. A wager boat divides the water, and does not *skim* its surface (a feat which is performed only by water spiders on duck ponds).

Mr. Cheverton seems to lose sight entirely of the fact I have quoted from Dr. Lardner's work.

In other parts of Mr. Cheverton's letter he contradicts himself, and draws false conclusions, which I shall not trespass upon your valuable space by further noticing.

He is, however, wrong in saying that I do not apprehend the meaning of the word *duty*; and I can assure him I am thoroughly alive to the importance of the element *time* in any mechanical question.

I once carefully modelled two boats with load water lines, formed as Nos. 2 and 3 in my diagram. No. 3 exactly doubled No. 2 in displacement, length, and weight, the midship sections being exactly similar in each. They were placed in water, and lines from each passed over pulleys; each had exactly the same weight attached to the end of the line. I started No. 2 a little in advance of No. 3, because No. 3 required more time to get into motion. Taking the starting point from where they became level with each other, I always found that No. 3 went twice as fast as No. 2; and as the weight attached to No. 3 descended twice as fast as the other, No. 3 was propelled with twice the power of No. 2. I am, Gentlemen, yours, &c., T. Moy.

1, Clifford's-inn, Oct 12, 1857.

MILLER'S METHOD OF PROPELLING VESSELS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I beg you will favour me with space for remarks on the letters of "A Mechanic" and of "Screw" appearing in No. 1783.

Though these correspondents have attacked me with closed visors, I will meet them by trying to put the best possible construction on their motives, and by supposing that we are all working in search of truth. I regret I am deprived of the pleasure this discussion would have afforded me from the dogmatical tenor of their letters, and the entire absence of ingenuousness.

The same ground of objection appears in both, viz., the disturbance of the pressures of displacement by the apertures of the horizontal tubes in the centre.

This subject ought to be understood, but they have taken a very strained and narrow view of it. If water flow continuously into a vacuous vessel through a horizontal tube in midships—say 20 feet under the surface—the aperture of which is 1 square foot, open to the water towards the stern; then, from a preponderance of pressure on the bow, the vessel will move astern with a power equal to about 3,600 lbs., supposing the pressure of the column of water and atmosphere to be 25 lbs. per square inch. I am not prepared to state the velocity with which water will flow into a vacuum under this pressure, but believe that it might even exceed 150 feet per second.

If I place a piston in this tube, connected to the steam piston of an engine, the pressure of the external fluid is borne on its area, opposing the steam power, and the result is, as "A Mechanic" states, that the vessel is impelled forward, the steam-cylinder and the tube passing over the pistons; that, in the latter, has to return through the vacuum in the tube caused by the motion imparted, and I will assume, that with the aid of the steam to the aforesaid pressure of 25 lbs., it will do so with velocity exceeding 150 feet a second. Now this single action of the one propeller comprises all the argument taken up against me, and, of course, the retarding effect to the motion previously given exists here to its utmost extent.

Had your correspondents given themselves time to investigate, (for I imagine they belong to a numerous class, who, affecting to have too little to spare, overestimate their discernment; the illusions of these men present, at all times, the greatest impediments to improvement,) they must have perceived, even in the brief sketch appearing in No. 1780, that the action of the four-throw crank shaft, connecting the four steam pistons, each working two such propellers as I have just described, is to alternate, without remission, on the whole eight propellers the entire power of the engine, so that the forward motion of the vessel is incessant. It would also have been evident to them, from the way the engines and propellers reciprocate, that, while at the same rate that the aggregate engine-power causes the shaft to rotate in propelling the vessel ahead, the propellers are made to return; the all-pervading law of gravitation keeps up the work to the engine by an ever-present and irresistible fulcrum of water on four propellers, which effectually checks the engine from flying off in revolutions in quick succession, and that the velocity with which water flows into a vacuum becomes—from the comparatively slow motion of the engine—power borne on the areas of the receding propellers, and that the retarding effect on the bow must be very little compared to the direct and unintermitted impulse exerted in propelling, and is fully compensated by the power thus imparted directly to the shaft in aid of the steam power.

For if, as aforesaid, the pressure on one square foot of the ship's bottom, 20 feet under the surface, be 3,600 lbs. when at rest, and the water there flow into a vacuum at 150 feet per second, the aggregate pressure, in favour of the bow to force the vessel astern, from four such orifices will be 14,400 lbs.; and if the engine, with 8 feet stroke, be making 15 revolutions per minute, so that the pistons are made to recede from the pressure of the following water at 2 feet per second, and the vessel is moving, say 28 feet in the same time, then 11,712 lbs. will be the fulcrum of water on the 4 propellers exerting the power of the engine, while, at the same time, from the disturbance of pressures caused by the others receding 30 feet, 2,880 lbs. are felt as a retarding power on the bow, and 11,520 lbs. are added to the power of the engine.

I propel by direct and rectilinear impulse from propelling pistons amidships, alternating on the horizontal pressure of water near the depth of the midship draught, and not by "pumps," "jets," "squirts," or any other means.

I still believe that I have patented a plan that, by the economy of time, space, fuel, and labour, will tend greatly to improve ocean navigation, particularly in ships making long and distant voyages, and one that merchants and ship-owners, in these close times, will find to their advantage to adopt.

In clipper ships of the most improved and scientific construction—I mean that mode patented by George Randfield Tovell, of Mistley, of which the *Margaret* cutter, launched at Colchester in 1853, was the first trial made, and recently very successfully again tried in the *Laughing Water*, lately returned from her first voyage to India and China—my plan can be adopted without the

cavity or hollow that would be required in flat-floored vessels.

Until "Screw" can advance true reasoning in support of his severe condemnatory remarks on my humble efforts, I cannot vie with him in the high estimation he has set on his gratuitous advice.

I am, Gentlemen, yours, &c.,

W. V. Miller.

Albert-villa, Mile End-road, Portsea, October 12, 1857.

AN IGNITOR FOR FIRING PERCUSSION BLASTING-CARTRIDGES, ETC.

The annexed drawing represents the end of an iron bar, cut so as to hold the twisted end of the little bag formed of the tough thin paper, called parchment paper; it is *moistened* before it is formed into the shape of a bag, as it then takes the proper form

more readily. The bag is filled with seven or eight heads of lucifer matches. The iron bar thus armed is placed on the wooden head of the cartridge; the other end of the bar projects four or five inches from the block of wood intended to be blasted. A smart blow from a plank allowed to fall on it will instantly cause the cartridge to explode and raise the stump or block of wood.

J. Norton.

Rosherville, Oct. 10, 1857.

MISCELLANEOUS INTELLIGENCE.

The New Barracks at Gosport.—Considerable progress is making in the completion of the new barracks at Gosport. In the design of these buildings every kind of modern improvement has been adopted. A separate pavilion is allotted for the married privates, and another for the non-commissioned officers, whose position will thus be more elevated than when obliged to associate with the private soldiers. These barracks are only to have one storey above the basement, so as to be kept as much as possible under shelter of the ramparts, and the tops are to be rendered bomb-proof, by being arched and covered with an arrangement of concrete and earth. The utmost attention has been paid to sanitary measures. The rooms will be so arranged as to admit of most complete ventilation, and the water-closets and sinks will be disposed in such a manner as to prevent effluvium arising from them, which is often the cause of much annoyance in old-fashioned barracks. The drains will be carried into Portsmouth harbour, two feet below low water-mark; and an excellent plan has been adopted for flushing them. A tunnel has been made from the moats surrounding the fortification (which are supplied from Haslar Lake) through the land into the drains, and when it is required to flush them, the water in the moat will be retained until the tide in the harbour has fallen several feet, when the sluices will be opened, and an impetuous stream of water forced through the drains, carrying with it all impurities. The arrangements for supplying water to these barracks have not yet been decided upon. Some months since a company was formed at Gosport for the supply of water to that town from a place about a mile and a half out of it. The process of boring for water at this place has not yet been completed, and consequently that source cannot at present be decided upon. It is also understood that the Admiralty contemplate leading water down to the Royal Clarence Yard from the high land near Fareham, which, if carried out, will probably be the source from which the new barracks will be supplied.

Taylor's Compensating Crane.—Mr. J. Taylor, of Middlesborough-on-Tees, has patented an improved crane, which consists of an ordinary crane with the addition of a second chain barrel set in motion by the ordinary barrel, but revolving at a less velocity. A chain from this second barrel is carried over a pulley on a second short jib projecting from the after part of the crane, and to this crane a series of weights are to be fixed according to the weights which the crane is working. The second barrel is thrown into and out of gear by a clutch or friction sheave, and when not in gear is held by a brake, or by palls. When goods are being lowered by the crane, their weight will raise the weight on the second barrel, and this again will wind up, or assist in winding up the chain on the first barrel as soon as it is released from the load and the brake relieved: at the same time the crane is to a great extent balanced by the weights on the second barrel, and there is less work for the brake to do. In some cases, however, it may not be convenient to apply a second jib, as for example in warehouse cranes. In such cases the second barrel and the weights may still be used for winding up the chain or rope, and for partly counterbalancing the descending load, the chain from the second barrel being taken over a pulley fixed in a convenient place.

In many cases one constant weight is sufficient, such weight being adjusted in the first instance to wind up the chain at a convenient speed, and being governed by the brake. In raising a load the second barrel can be disconnected and the crane used in the ordinary way, or the weight on the second barrel can be used to assist in lifting the load.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

HOLDEN, I. *Improvements in washing and drying wool and other fibres, part of which improvements is applicable when connecting together lengths of leather for other purposes.* Dated Jan. 30, 1857. (No. 278.)

These relate to the adaptation of a system of railways as a means of facilitating the bringing of any of the series of steeping cisterns (in which the fibre is first steeped) into connection with the first of a series of washing apparatus used in washing fibres. Also to the adaptation of filtering media in a separate chamber to receive the spent wash waters, in order to separate from such spent liquors the fibre which becomes mixed therewith during the washing. Also to substituting for the endless cloths or aprons used in feeding the fibre into such washing apparatus, series of bars or rods affixed to, and supported by, endless chains, the links of which are connected together by hinge joints. Also to means by which the patentee connects together adjoining ends of leather aprons or cloths used in washing apparatus, viz., by employing a plate or plates with studs projecting therefrom of a conical form, the larger part being furthest from the plates, and in placing the edges of the leather to be connected in contact over the plates, part near one edge on one set of pins, and the other part near the other edge on the other set of pins of each plate, and then hammering the leather thereon till the studs have forced their way through the leather. The sliver is conducted by suitable funnels or guides from one cylinder to the next in such manner that it may be wound thereon, and from one to the other, and back in a spiral direction, commencing at one end and coming off at or near the opposite, by which increased heating surface is obtained.

HOLDEN, I. *Improvements in combing wool and other fibres.* Dated Jan. 30, 1857. (No. 279.)

These relate—1. To operating upon the fibre between the circular or other passing or carrying comb (upon which it has been fed), and the rollers for drawing off therefrom by other comb teeth for the purpose of keeping back the knots and dirt from the fibre as drawn from the teeth of such carrying or passing comb. The teeth of such intermediate comb point in a direction opposite, whilst they travel in a direction parallel, or as nearly so as possible, to that of the circular or other passing comb. They also relate to means of operating so as to effect a transfer of the fibre from the teeth of the comb into which it has been fed to the teeth of another to be drawn off, and consist in causing the teeth of one comb, while pointing towards the other, to come into position to take the fibre as pushed off or drawn up out of the carrying comb, whereby the oil and dirt or other matters which would be engaged in the teeth of the carrying combs, and immediately in front of it, will be laid into and behind the teeth of the taking comb, and there left by the drawing-off rollers. 2. To mouthpieces or funnels employed in conducting fibre from the feeding means to passing or carrying combs in order to its being combed. The opening through these is reduced, in order that the sliver or fibre passing therethrough may be subjected to considerable compression, and thereby have friction put on it in such passage. Also the length through such funnel is made at least equal the length of the staple treated. Such mouthpieces have also a hinge joint to admit of the motion of the feeding means, and are fed by plain (in place of fluted) rollers. 3. They consist in substituting for such mouthpieces series of plain rollers, the supporting frame of which is capable of motion to adjust itself to the line of draft between the holding feed rollers and the comb to which the fibre is fed.

HOLDEN, I. *Improvements in preparing and combing wool and other fibres.* Dated Jan. 30, 1857. (No. 280.)

These relate to means for imparting "a square or rectangular" motion to gill-comb bars, and consist in using certain quadrangular frames (one to each end of the bars). Also, to connecting the frame, which, by acting upon each end of the gill-bars, effects the rising of them from the lower to the upper tiers, with the frame which effects the descent of them from the upper to the lower tier, so that they may be simultaneously operated upon by one cam or tappet acting upon friction pulleys. Also for certain means of giving motion to the gill bars, &c. Also to forming the races or supporting parts between the upper and lower series of gill-bars, hollow to receive steam or other media, to communicate heat to such gill-bars. Also to forming gill-bars hollow at their ends, for giving lightness thereto. Also to forming gill combs, used as working combs, with some of their teeth at one end (that nearest the drawing-off rollers) longer than the others.

HOLDEN, I. *Improvements in carding wool and other fibres.* Dated Jan. 30, 1857. (No. 281.)

These relate—1. To the application of heat in carding engines to the pair of card-rollers which receive the fibre from the feed apron, as also to the first opening cylinder, when another or other opening rollers, with workers are employed, intermediate thereof, and the main cylinder. 2. To arrangements of parts of carding engines, with a view to lessen, if not altogether to avoid, the formation of knots, and to separate the staple during the process without breaking the fibres.

SMITH, H. *Certain improvements in window price-tickets, and which said improvements are also applicable to the ornamenting and prizing the wrappers or paper boxes for holding fancy and other goods, also in the mode of attaching or suspending window-tickets.* Dated Jan. 30, 1857. (No. 282.)

This consists in printing an ornamental border or other emblazonment, and indicating the price by dies and pressure, thus exhibiting such characters in relief.

AFFLECK, T. *Improvements in machinery or apparatus for pulping coffee.* Dated Jan. 30, 1857. (No. 283.)

This consists in apparatus obtained by placing the cylinder usually employed (having a grated or toothed surface) with its axis in a vertical position, which enables the patentee to arrange around it any required number of operating edges, called "chops."

OWEN, J. *Certain improvements in machinery or apparatus for the prevention of accidents in ascending and descending shafts of mines, which said improvements are also applicable to hoisting and other lifting machines.* Dated Jan. 30, 1857. (No. 284.)

Upon each side of the cage two levers are situated, one on each side of the guide rod extending from the top to the bottom of the shaft. These levers turn upon pins secured to the side of the cage. The ends of these levers nearest the fulcra are tapered, and provided with a serrated edge, in order to grip the guides; the opposite ends are each secured by a hinge joint to the connecting rods, which are united above the cage by the tie rods, to which a link is attached for securing the cage to the winding rope. When the cage is suspended, the holding ends of the levers are drawn away from the guide rods, but on the rope breaking, the whole weight of the cage is thrown upon the fulcra, and consequently the short ends rise and grip the guide rods, whereby the cage is supported.

WILLIAMS, J. A. *Improvements in machinery or apparatus for ploughing or tilling land by steam power.* Dated Jan. 30, 1857. (No. 285.)

The inventor uses two steam engines, one at each end of the field, made self-moving for transport, by an endless chain fitted with cross pins or spindles, worked from a notched pulley on the crank shaft and gearing into a larger notched pulley on one of the hind wheels of the engine. A drum or roller, having its bearings on longitudinal beams, and a rope or chain wound round it and fixed to an anchor, gives a hauling traverse motion thereto to enable the engine to take up a fresh position. The invention includes several other features.

MORRISON, D. *A new or improved manufacture of ordnance.* Dated Jan. 31, 1857. (No. 288.)

Claims—1. Casting ordnance in moulds having a metal core upon which the bore is cast, whether the said core be plain or have a curved projection to rifle the bore of the ordnance. Also, inserting tubular metallic linings in the said ordnance. 2. Casting ordnance upon a metallic tube, which tube constitutes the bore of the ordnance. Also, boring out the said tubes when worn and replacing them by new ones. 3. Manufacturing ordnance by supporting a tube by means of prismatic bars situated around and fixed upon the said tube. 4. Manufacturing ordnance by binding together a series of bars of steel of such forms that when bound together they constitute a hollow cylinder.

HARGREAVES, W. *Improvements in machinery for preparing and combing wool, hair, silk, cotton, flax, and other fibrous substances.* Dated Jan. 31, 1857. (No. 289.)

A cylinder has a quantity of combs attached thereto, each comb having a sliding doffer to strip the combs as they proceed, and also a porcupine connected to a pair of drawing rollers, the porcupine to work only a part of a revolution at a time and then make a complete stand, so that the drawing rollers will strip the porcupine in separate feeds every time the porcupine moves or makes a part of a revolution.

WHITTLES, H., and R. SCHOFIELD. *Improvements in the construction of slide valves of steam engines, and in the mode of working the same, for the better regulation of the vacuum in the cylinders thereof, economizing fuel, and for ensuring safety and steadiness of such machines whilst in action.* Dated Jan. 31, 1857. (No. 290.)

This consists in combining a second or auxiliary D-slide with the ordinary D-slide employed, and in methods of adjusting and actuating this auxiliary slide.

NEWTON, W. E. *Improvements in the manufacture of buttons.* (A communication.) Dated Jan. 31, 1857. (No. 291.)

These consist—1. In making shank buttons of clay, porcelain or other plastic ma-

terials, screw-tapped or plain conical holes being provided and filled with fusible metal in order to fasten the shanks when placed therein. 2. In apparatus for making the said screw-tapped or conical holes.

WORRALL, J. M. *An improvement in finishing certain descriptions of fustians called cords and thicksets.* Dated Jan. 31, 1857. (No. 292.)

This consists in finishing "cords" and thicksets after (or nearly after) the present method of finishing "beverteens." The patentee raises the surface of the cloth (as it comes from the loom) by the operation of the "raising machines," and subsequently shears such raised surface by ordinary shearing machines.

HOWARTH, D. *The application of a substance, substances, or composition, not hitherto used for sizing or preparing woollen or worsted yarns or warps for weaving.* Dated Jan. 31, 1857. (No. 294.)

This consists in applying gums or gummy matter obtained from vegetable substances to the above purpose, wholly or partially, instead of animal sizing.

PRICE, A. P. *Improvements in the separation of gold from certain auriferous mixtures, compounds, and products.* Dated Jan. 31, 1857. (No. 295.)

Claims—1. The treatment of the above mixtures, &c., by converting them into an auriferous regulus, or an artificial sulphuretted auriferous regulus, consisting essentially (by preference) of sulphuret of iron or copper, or mixtures thereof, and subjecting the same to calcination, with or without salt, and the separation of gold therefrom by the employment of an aqueous solution of chlorine, or chlorine and water, or of a solution of an acidified hypochlorite, from which solutions the gold may be precipitated by proto-sulphate of iron or other agent. 2. The extraction of gold from any such artificial regulus before referred to (calcined as aforesaid), by means of chlorine and water, or an aqueous solution of chlorine, or of a solution of a hypochlorite in conjunction with an acid so as to liberate a solvent for the gold, the gold being afterwards precipitated therefrom.

DRAY, W. *An improvement in ploughs.* Dated Jan. 31, 1857. (No. 296.)

This relates to such ploughs as are provided with a share in the form of a pointed bar, and consists in means of securing the bar in its position after having been pushed forward as required from the wearing away of the point thereof. On one side of the bar a rod is fitted with an eccentric which moves in a recess. By turning the spindle so as to bring the eccentric against the side of the share bar, it is held tight, and by turning it the reverse way, that is into the recess, the share bar is liberated and may be moved forward to the extent required, and there fixed by turning the eccentric against it.

HOLDING, W. H., and J. R. CASSAY. *Improvements in the manufacture of soap.* Dated Feb. 2, 1857. (No. 297.)

The patentees take ordinary resin and heat it in a still to 600° or 700° Fahr. This decomposes the resin, and the following products come off:—A volatile gas, a spirituous liquor resembling naphtha, and an unctuous oil; the pitch remains in the still. The volatile gas they separate as soon as it leaves the still; the spirituous liquor and oil they pass through a horizontal condenser surrounded with cold water, the oil coming off after the spirit. This oil they a second time subject to the action of the still so as to volatilise and separate any of the essential oil or spirit which may be held in it, and finally they draw it off from the still, and apply it in combination with fats, &c., to the manufacture of soap.

SYMONDS, C. *Improvements in ships' night signals.* Dated Feb. 2, 1857. (No. 298.)

The object here is to enable vessels distinctly to denote their position and track, by means of coloured lights, shown from the signal lantern, which is constructed so that it is capable of showing variously coloured lights, one colour at a time, by diversified coloured glasses, lenses, or bull's eyes, fitted into the lantern frame, which can be turned round the lamp.

DUDEBOUT, J. F. *Certain improvements in looms for weaving.* Dated Feb. 2, 1857. (No. 301.)

This consists in the use of two metallic combs or reeds (in lieu of the ordinary harness) for raising and sinking the warp threads, to produce the shed for weaving gauze, barège, silk, satin, and crape.

HODGSON, B., and J. CARTER. *Improvements in apparatus for introducing the pile wires used in weaving Brussels carpets and other piled fabrics.* Dated Feb. 2, 1857. (No. 302.)

The peculiarity of the apparatus consists in the application of a screw motion to introduce, and also a screw motion to withdraw the wires.

MUIR, M. A., and J. M'ILWHAM. *Improvements in moulding or shaping metals.* Dated Feb. 2, 1857. (No. 304.)

This relates to an invention recently patented by M. A. Muir and D. M'Ilwham, and mainly consists of an arrangement for turning the platforms on which patterns are placed.

MORRISON, R. *Improvements in steam boilers.* Dated Feb. 2, 1857. (No. 305.)

This relates to stationary engines with vertical, cylindrical, or conical boilers, having vertical flues up through them, and

consists in constructing such flues of a peculiar form, with the fire-box near the bottom, and with a double chimney, to contain between its inner and outer plates water to be heated before passing into the boiler.

RAYNER, T. W. *Improvements in cocks and valves.* Dated Feb. 3, 1857. (No. 307.)

This refers principally to cocks and valves used for water-closets, baths, &c., and cannot be described without engravings.

HUNT, J. *Certain improvements in shovels and spades for general use.* Dated Feb. 3, 1857. (No. 308.)

This consists mainly in making spades, shovels, &c., by the action of rolls, making solid steel shovels, making solid spades or shovels one side entirely of steel, and the other of iron; and, lastly, in methods of making solid spades and shovels generally.

GARAND, F. *Improvements in transmitting motion, and means of stopping it immediately.* Dated Feb. 3, 1857. (No. 309.)

This consists of a certain substitute for "coupling muffles."

LAMING, R. *Improvements in purifying gas, in obtaining materials useful for that purpose, and in working up into useful products certain ammoniacal and phosphatic substances obtainable as residues in the purifying of gas.* Dated Feb. 3, 1857. (No. 311.)

This invention is described at page 369 of this number.

TAYLOR, J. *Improvements in the governors for the engines of screw steamers, and other vessels propelled from the stern.* Dated Feb. 3, 1857. (No. 312.)

The patentee fixes a tube on the vessel near the screw, and connected with the outside, so that the water may rise and fall in it with the pitching of the vessel. In this tube he places a float which gives motion to the throttle or other valve of the engine. By this means, when the screw is partially out of the water, the steam is partially shut off.

TAYLOR, J. *A compensating crane.* Dated Feb. 3, 1857. (No. 313.)

This invention is described at page 373 of this number.

WHITE, G. *Certain improvements in dyeing and printing textile fibres and fabrics.* (A communication.) Dated Feb. 3, 1857. (No. 314.)

These relate to the application of murexide or other colouring products derived from uric acid, to the dyeing and printing of fibrous materials and fabrics, the invention having principally for its object certain modes of fixing the said products.

BERNARD, J. *Improvements in fastenings for uniting wood, metal, cloth, leather, and other materials.* Dated Feb. 3, 1857. (No. 316.)

The fastening is made with a point at each end, and so that each part will only enter a certain distance into the materials to be united, shoulders being made upon the fastening.

HART, S. *Improvements in apparatus for raising and forcing water.* Dated Feb. 4, 1857. (No. 323.)

A fixed cylinder, with its lower end in the water, has an opening at the bottom, and another near the top for the rising pipe. Within it is an inner cylinder, with the lower end closed, except where it comes over the opening into the fixed cylinder, where there is a corresponding opening into the inner cylinder. The interior of the inner cylinder is formed with a spiral channel, up which the water rises when the inner cylinder is caused to rotate, and the water raised passes out at the upper part into the outer cylinder, and thence up the rising pipe.

DE BERGUE, C. *Improvements in the method of, and apparatus for, laying the permanent way of railways.* Dated Feb. 14, 1857. (No. 324.)

This is especially applicable to permanent ways constructed of rails laid on cast iron sleepers, (sleepers and chairs in one), and consists in fixing together (in gauge) the different parts of a length (two rails) of permanent way, before laying the same on the ballast; and in the use of a framing for placing a number of tie bars or sleepers, or both, in definite positions upon them, so that on placing the rails upon the sleepers, they may be fixed together without further adjustment.

NEWTON, A. V. *An improvement in machinery for polishing flat surfaces of glass and other substances.* (A communication.) Dated Feb. 4, 1857. (No. 326.)

This relates to polishing machinery in which the polishing bed and the surface to be polished rotate on separate eccentric axes, and it consists in grooving the surface of the polishing bed in circles eccentric to its axis of rotation.

JOHNSON, J. H. *Improvements in the treatment of flax and similar textile materials.* A communication. Dated Feb. 4, 1857. (No. 328.)

This relates—1. To a mode of treating flax, &c., whereby retting is dispensed with, and the total removal of the gummy matters, &c., accomplished. 2. To a mode of separating the fibres afterwards. In the first place, the patentee combines an alkali with the gummy matters adhering to the fibres, and then effects a reaction upon this alkali by an acid, and well rinses the fibres in water. Secondly, he dries the fibrous substance, and impregnates it with a chemical salt or substance, which will liberate gas freely on the application thereto of an acid.

If the fibres be now subjected to an acid solution, the rapid disengagement of the gas which will be effected will cause them to be separated.

SCHAFER, P. and F. *Improvements in travelling bags or cases, and an apparatus for carrying fittings therein.* Dated Feb. 5, 1857. (No. 331.)

This consists—1. In constructing the side frames so that they may open from the bottom of the bag and form another part higher up. 2. In fitting standards in conjunction with such double opening frames, which form part of the frame, impart strength thereto, and at the same time serve to support an inner holder, to which are connected the fittings for containing the usual contents of a dressing case, desk, workbox, and the like.

MYERS, H., C. ASKEW, and J. ASKEW. *Improvements in railway and other breaks, and communicator between the guard and driver of railway carriages.* Dated Feb. 6, 1857. (No. 338.)

This refers to a mode of arranging horizontal metal rods and tubes, to which rods a band is affixed to clutch round drums attached to the wheels, so that, if required, the train can be stopped, and the signalling, in case of danger, to put on the brakes, shall be self-attaching, and capable of instantaneous communication between the engine-driver and guard.

GREEN, W. *Improvements in manufacturing or procuring substitutes for leather for boots, shoes, and other uses, and in machinery or apparatus for effecting the same.* Dated Feb. 6, 1857. (No. 339.)

This consists in producing imitations of leather on fabrics and other suitable materials after they have been formed into the desired shape ; also in producing imitations of leather on fabrics and other suitable materials by means of heated rollers, cylinders, or hollow dies, on the surface of which a fac-simile in reverse of hard grained leather has been produced by the electrotype process or other equivalent means.

BROOMAN, R. A. *Improvements in preparing or dressing threads and other fibrous materials, and in the machinery employed therein.* (A communication.) Dated Feb. 6, 1857. (No. 340.)

This consists in improvements on an invention, for which E. C. T. Croutelle obtained letters patent, Feb. 3rd, 1852 ; and it comprises improvements in and connected with the rollers and framework described in the specification of the said invention, and also a method of drying the fibres.

GILROY, J. *Improvements in applying starch or other semifluid matter by machinery to woven fabrics.* Dated Feb. 6, 1857. (No. 341.)

The woven fabric is carried forward continuously, and in contact with one of its surfaces is a starching roller, whose surface is supplied with starch, and made to move in the direction contrary to that in which the fabric moves.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

LENZ, C. *An improvement in the manufacture of cast steel.* Dated Jan. 30, 1857. (No. 274.)

The object here is to melt and convert iron in a granulated or pulverised state direct into cast steel, by melting the same in combination with oxides after methods already known, but without the use of crucibles or melting pots. In place of these the inventor uses furnaces, in the hearth of which a cavity is constructed to receive the materials to be converted and to expose them to the action of the heat. To prevent the atmospheric air, flame, and gases of combustion acting detrimentally upon the metal, he covers it over with a layer of glass, clay, earth or oxides. When the metal is converted he runs it out down an iron funnel lined with fire-clay, and thus supplies a regular and continuous stream of fluid steel to moulds placed to receive it.

ELLIS, T. *Certain improvements in the preparation of India-rubber and gutta percha by combining therewith other materials.* Dated Jan. 30, 1857. (No. 275.)

The object is to combine with India-rubber or gutta percha certain metallic bodies, whereby they will be rendered more durable when subjected to violent action or the friction of rubbing surfaces.

WRIGHT, A. *An improved manufacture of malt.* Dated June 30, 1857. (No. 276.)

This relates to the submitting of barley or other grain to a certain process previously to its being dried in the kiln, whereby the starch contained in the grain is changed into saccharine matter and dextrine or soluble starch.

HENSEL, A. *Making compressed yeast.* Dated Jan. 31, 1857. (No. 286.)

To a distillation of malt and hops are added natron, carbonicum, and Russian potassium, together or separate, the whole being compressed.

APPLEBY, R. *Improvements in washing machines.* Dated Jan. 31, 1857. (No. 287.)

This consists in the adaptation to washing machines of spiral and parallel beaded rollers, the clothes to be washed being drawn up and down between two series of them, they yield to the pressure in an outward direction, and returning by gravity on the removal of such pressure.

COOPER, D., T. W. HEATON, and T. L.

LANGSHAW. *An improved apparatus applicable to the purposes of ventilation.* Dated Jan. 31, 1857. (No. 293.)

This relates to a rotating fan constructed of a series of vanes placed at suitable angles on a vertical spindle, enclosed within a casing, the upper part being open. The apparatus is placed in the ceiling or roof.

MIDDLETON, J. *Improvements in consuming the smoke of furnaces.* Dated Feb. 2, 1857. (No. 299.)

These consist in conveying the smoke and gases back to the ash-pit of the furnace, and causing them to pass through the fire.

ROBINSON, R. *Improvements in machinery or apparatus for finishing yarns or threads.* Dated Feb. 2, 1857. (No. 300.)

Two revolving rollers are arranged in a frame, one moving in a vertical slot for stretching the yarn to its required tension. Any convenient number of polishing rollers work in contact with the yarn during its motion on the stretching rollers, the said polishing rollers being grooved in the direction of the revolving yarn, the grooves serving to carry off any surplus moisture that may remain in the yarn, as well as to give it a better finish. The rollers are covered with some anti-corrosive substance.

JOHNSON, J. H. *Improvements in heating the feed-water of steam boilers.* (A communication.) Dated Feb. 2, 1857. (No. 303.)

An apparatus is placed between the feed pumps and the boiler, and consists of a vessel containing a number of dished plates forming a series of steam chambers, the water to be heated being contained round these chambers. Near the mouth of each chamber is a plate for spreading the steam through the chamber. The waste steam enters at the top, and, after passing through the chambers, escapes at the bottom.

COWBURN, T., J. PRESTON, and J. SHETLOCK. *Improvements in apparatus for regulating and indicating the pressure of steam and other fluids.* Dated Feb. 3, 1857. (No. 306.)

The steam (or other fluid) is caused to pass through two valves fixed to the same spindle, which is connected to a hollow lever mounted on a hollow axle. The lever contains mercury on which the steam, after passing through the valves, acts by passing through apertures in the hollow spindle. When the pressure on the fluid increases, the mercury is moved further up the lever, and closes the valves. When the pressure is reduced, the mercury runs down, allowing a counter weight to open the valves.

LUND, W. *Improvements in securing cases containing bullion and other valuable property, parts of which are applicable to the securing of bales and other packages.* Dated Feb. 3, 1857. (No. 310.)

This consists in a method of additionally securing cases and packages by bands of iron, &c., so that any attempt to open them will be apparent. Also in securing cases, boxes, &c., where wire or cord is passed round them, by means of a leaden disc with rising arms, which are turned down and form a seal by an engraved punch over the ends of the wire or cord, and secure the same, unless the leaden seal is broken.

COCHRANE, C. *An improvement in heating blast for blast furnaces and cupolas.* Dated Feb. 3, 1857. (No. 315.)

The blast used is caused to pass partly through burning fuel, and partly to the furnace directly. The two currents mix and form the desired heated blast.

UNWIN, H. *Improvements in the application of waste heat from coke ovens.* Dated Feb. 3, 1857. (No. 317.)

This relates to the application of such heat to heating steam boilers for driving engines or other purposes.

STEINMETZ, A. *A method, mode, contrivance, or management, to check the honesty of omnibus conductors and other receivers of money under similar circumstances, to be accounted for to their employers, without machine or mechanical contrivance.* Dated Feb. 4, 1857. (No. 318.)

Each omnibus conductor (or other such person) is to be provided with a certain number of tickets, bearing the date and the name of conductor, &c., for issue to the party who pays a fare.

HAMSHER, J. *Improvements in the manufacture of blacking for polishing, softening, and preserving boots and shoes, and other leathern articles.* Dated Feb. 4, 1857. (No. 319.)

The materials used are ivory-black, treacle, rape-seed oil, a mixture of gums, oil of vitriol, copperas, and vinegar.

GANDINI, O. *An indicating target.* Dated Feb. 4, 1857. (No. 320.)

This relates to a new target, to be used with an indicating apparatus for denoting the number of times that particular parts have been struck.

LEWIS, E., and G. BÖHM. *Improvements in printing in colours, called an improved photogalvanographic chromographic process.* Dated Feb. 4, 1857. (No. 321.)

This consists in the use of plates (or impressions therefrom) as produced by Herr Pretsch's photogalvanographic process as a basis for pictures printed in colours.

MOREAU, F. *Recovering the fatty matters from coom or dirty axle grease and lubricating oils, thereby rendering them fit to be used again.* Dated Feb. 4, 1857. (No. 322.)

The inventor boils these materials with an alkaline solution for decomposing the metallic soap contained in the grease, but

not enough to saponify the remainder of the grease.

NEWTON, W. E. *Improvements in piano-fortes.* (A communication.) Dated Feb. 4, 1857. (No. 325.)

This consists in balancing or placing the centres of motion of the keys at, near, or above the top thereof.

BURROWS, J. *Certain improvements in steam engines.* Dated Feb. 4, 1857. (No. 327.)

These consist in the use of a refrigerating apparatus arranged with the air-pump and condenser, for cooling the water used for injection, so as to use the same water over and over again, a portion of it being constantly supplied to the boilers.

HOUSTON, R. H. *Improvements in effecting general conveyance or transport on water.* Dated Feb. 4, 1857. (No. 329.)

Buoyant cylinders are used for supporting and propelling boats, vessels, platforms, &c., clear of the water, or nearly so.

SUMMERS, T. *Improvements in gauges for indicating pressure and vacuum.* Dated Feb. 5, 1857. (No. 330.)

This relates to a contrivance by which the ordinary mercurial column steam pressure gauge can be so constructed as to be available for indicating pressure and vacuum alternately in the same gauge.

NEWTON, A. V. *An improvement in casting metallic articles.* (A communication.) Dated Feb. 5, 1857. (No. 332.)

An iron mould is provided with a vent for the escape of air, and before using the mould it is first filled with plumbago, and the gate (through which the metal is poured) is closed with an iron plug. The mould is then heated in an oven to cherry-red heat. The plug is now removed, and the metal is poured. After this the mould is allowed to cool only so much as is necessary for the safe removal of the casting; and the heating and pouring is repeated to obtain a second casting.

BRAZIL, C., and W. N. CRUMMACK. *Improvements in looms for weaving.* Dated Feb. 5, 1857. (No. 333.)

This relates—1. To a method of bringing the shuttles of rising box looms into required positions. 2. To a method of actuating the taking-up motion, so as to cause it to progress at different rates in order to produce a fabric varying in closeness of texture, and with which a fine and coarse weft thread may be used.

SMITH, H. *Improvements in hay-making machinery.* Dated Feb. 5, 1857. (No. 334.)

This relates to a mode of obtaining the reverse action in hay-making machines, the object being to prevent the necessity of sliding any of the gearing wheels on their respective shafts, and thus to remove the tendency of the gearing wheels (which they possess when mounted so as to slide) working out of gear, giving the machinery a lateral strain.

NEWTON, W. E. *Certain improvements in breech-loading fire-arms.* (A communication.) Dated Feb. 5, 1857. (No. 335.)

This relates to a mode of constructing a magazine within the stock of a fire-arm to contain a large number of ball-cartridges or loaded balls, and mechanism employed with the magazine, and with a moveable breech to cause the cartridges to be supplied one at a time, as required, to the barrel by the act of opening and closing the moveable breech. It also comprises a mode of combining the hammer with the moveable breech to effect the cocking.

CHOWEN, G. *Preventing further casualties on the Goodwin Sands.* Dated Feb. 5, 1876. (No. 336.)

It is proposed to encompass the entire area of the Goodwin Sands with buoys, each furnished with a large sonorous bell.

STOTT, T. *Improvements in pickers.* Dated Feb. 6, 1857. (No. 337.)

The picker is made of malleable iron, and of light construction, with a hole or recess in that part which strikes the shuttle tip, in which recess is fixed a spring at the far end covered at the front with horn, buffalo hide, or other similar substance.

WORRALL, J. M. *An improvement in finishing a certain description of fustians called "diagonals."* Dated Feb. 6, 1857. (No. 342.)

This consists in finishing such goods in a similar manner to beaverteens, by raising the surface by the ordinary machinery employed for that purpose, and afterwards shearing the surface raised, so as to present a velvet finish.

PROVISIONAL PROTECTIONS.

Dated August 12, 1857.

2152. Robert Wagstaff, of Mottram-in-Longdendale, Chester, blacksmith. Certain improvements in locomotive engines to be employed on common roads or ways applicable to agricultural and other similar purposes.

Dated August 27, 1857.

2270. John Henry Christian Löbnitz, of Renfrew, N.B., engineer, and James McLintock Henderson, of the same place, ship builder. Improvements in steam engines.

Dated August 28, 1857.

2276. John Muckart, of Montrose, N.B., starch manufacturer. Improvements in effecting the combustion of fuel, and the consumption or prevention of smoke applicable to boiler furnaces.

Dated September 16, 1857.

2398. George Davies, of Serle-street, Lincoln's-inn. Improvements in the manufacture of cloth or woven fabrics composed of a mixture of wool and a vegetable filamentous material, not hitherto used for such a purpose. A communication from G. Ahman and A. de Villeneuve.

2402. John Hathornthwaite Winder, of Sheffield, manufacturer. Improvements in rotary steam engines and pumps.

Dated September 17, 1857.

2409. Edward Hayes, of Stoney Stratford, Bucks. Improvements in winding apparatus for hauling ploughs and other agricultural implements.

2411. Isac Louis Pulvermacher, of Paris, engineer. Improvements in apparatuses for creating electric currents, chiefly for medical purposes.

Dated September 18, 1857.

2415. Benjamin Burleigh, of Great George-street, Westminster. Improvements in the mode of laying submarine telegraphs.

2419. Daniel Imhof, of Oxford-street, organ builder. Certain improvements in machinery adapted to the exhausting or forcing of air gases or vapour, and in the application of such machinery to various useful purposes.

2421. Samuel Whitehead, of Bury, Lancaster, tailor. Improvements in trowsers as part of male attire.

2423. Richard Watson, of Galashiels, N.B., manufacturer. Improvements in weaving.

2425. Thomas Wilson, of Chiswick. An improved boot and shoe cleaning apparatus.

2427. Sir James Caleb Anderson, of Fermoy, Cork, Baronet. Improvements in locomotives and other carriages.

2429. Henry Saxon Snell, of Chancery-lane. Improvements in apparatus for retarding omnibuses and other carriages.

2431. John Watson Burton and George Pye, of Ipswich, flax manufacturers. Improvements in the construction of rollers used for pressing fabrics and fibrous and other materials.

2433, Arthur Rigg, sen., and Arthur Rigg, jun., of Chester. Improvements in preparing, sawing, planing, grooving, tongueing, moulding, mortising, and tenoning wood, part of which is applicable to preparing other vegetable substances.

Dated September 19, 1857.

2434. William Naylor, of Bradford, York, manufacturer. Improvements in power looms for weaving worsted, cotton, silk, woollen, and other fibrous substances.

2435. Montague Richard Leverson, of Saint Helen's-place, City. Improvements in the preparation of food for cattle. A communication from F. P. Auburtin, of Paris.

2436. François Cavalerie, of Paris. Improvements in motive power engines.

2437. William Henry James, of the Old Kent-road, civil engineer. Certain improvements in steam vessels, parts of which improvements are applicable to sailing and other vessels.

2438. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. A method of decomposing soapy wash waters, used in the washing and scouring of wools and cloths, of separating therefrom fatty matters held therein, and of treating such fatty matters. A communication from F. Picard.

2439. William Henry Peake, of Liverpool. Improvements in the construction of beams, girders, and bridges.

2440. William Thomas Eley, of Broad-street, Golden-square. Improvements in percussion caps.

2441. Henry Ormson, of Stanley Bridge, Chelsea, horticultural builder. An improvement in the manufacture of cast tubular boilers.

2442. John Minnitt, of Nottingham, tallow chandler. An improvement in extracting grease from animal refuse resulting from the manufacture of glue and from fell-mongers' processes.

Dated September 21, 1857.

2443. Pierre François Joly, civil engineer, of Paris. Improvements in apparatus for generating and superheating steam.

2444. Robert Gray, of Sheffield, draper. An improved band or cord to be employed for distending or expanding skirts or similar wearing apparel.

2445. George Schaub, of Birmingham, electro metallurgist. A new or improved manufacture of rollers or cylinders, with patterns or designs thereon, for printing fabrics and other materials.

2446. Louis François Picot, of Toulon, France, mechanician. Improvements in salinometers or instruments for indicating the saturation of water in marine boilers.

2447. Edmund Lloyd Owen, of Wolverhampton, merchant. A new or improved method of propelling vessels.

2449. John Absterdam, of Massachusetts, U.S. A certain new and useful improvement in electric telegraphic cables.

2450. John Paterson, of Wood-street, London, manufacturer. An improvement in clasps, buckles, and other like fastenings.

Dated September 22, 1857.

2451. Daniel Forrester, of Mortimer-road, Kingsland. An improved fastening for securing watches, &c., worn on the person, whereby the same are rendered safe from robbery, to be called "Forrester's Patent Watch and Property Protector."

2452. George Jarvis Worssam, of Oakeley-crescent, City-road. An ink self-supplying penholder.

2453. Meinrad Theiler, of North-terrace, Westminster-road, mechanic. A direct printing telegraph without relais and local battery. A communication from F. Theiler.

2454. Michael Henry, of Fleet-street. Improvements in the mode of transmitting motion, especially applicable to apparatus employed in navigation. A communication from R. Tissot.

2455. John Ford, of Stepney, gentleman. An improved apparatus for marking or scoring at whist and other games, which may be adapted for otherwise assisting the memory of the players.

2456. Ramsey Lawson, of Manchester, engineer. Certain improvements in apparatus for regulating the admission of air to furnaces.

2457. Hesketh Hughes, of Wellington-street, engineer. Improvements in machinery for cutting, embossing, and stamping.

2458. George Rennie, of the Albion Iron Works, Holland-street, marine engine builder. Improvements in vessels for war and revenue purposes.

2459. Alfred Vincent Newton, of Chancery-lane. Improvements in obtaining photographic pictures. A communication from D. A. Woodward, of Baltimore, U.S.

2460. William Edward Newton, of Chancery-lane. Improved machinery for forging metals. A communication.

2461. William Stettinius Clark and Benjamin Moore, of High Holborn. Improvements in machines for cutting splints for friction matches. A communication.

2462. Alfred Count de Bylandt, of Michaels-grove, Brompton. Improvements in propelling ships or other navigable vessels.

Dated September 23, 1857.

2463. Frederick Collier Bakewell, of Haverstock-terrace, Hampstead. Improvements in the preparation for use of caustic alkalies. A communication from G. Thompson, of North America.

2464. Pierre Oury, of Hatton-garden, cap manufacturer. An improved apparatus and method for impressing or marking figures or designs upon silk, cotton, or other suitable substances employed for lining caps, hats, and other similar articles.

2465. Peter Armand Le Comte de Fontainemoreau, of London. An improved method of marking paper for postal purposes. A communication.

2466. Adam Murray, of Bradford, Lancaster, manufacturer, and William Pollard, of the same place, weaver. Improvements in the manufacture of textile fabrics.

2467. John De La Haye, submarine engineer, and Mark Bloom, silk manufacturer, both of Salford. Improvements in laying down submarine telegraphs.

Dated September 24, 1857.

2469. William Beckett Johnson, of Manchester, engineer. Improvements in raising and lowering trucks, carriages, engines, or other such railway appendages from one level to another.

2470. Thomas Singleton, of Over Darwen, Lancaster. Improvements in looms.

2471. Augustin Vrain Adrien Laugère, of Orleans, France. Improvements in windmills.

2472. Thomas Saunders, of Pump-row, Old-street-road, locksmith. An improved tumbler key and lever tumbler lock.

2473. Abraham Booth Patterson, of Baltimore, U.S. An improved mode of laying submarine cables.

Dated September 25, 1857.

2474. John Barber, of Manchester, machinist. Improvements in machinery or apparatus for manufacturing rollers or cylinders used for printing and embossing woven fabrics, paper, leather, and other materials.

2475. John Kelshaw and John Wilkinson, of Elland, York, machine makers. Improvements in self-acting couplings for railway carriages and engines.

2476. Leopold Newton, of Oldham, Lancaster, cotton spinner. Improvements in the mode of placing tubes on the spindles used in spinning machinery.

2477. John Fortescue, of Charles-street, Middlesex Hospital, baker. Improvements in the construction of domestic or other fire places, for the purpose of consuming smoke and saving fuel.

2478. James Gregory, of Bitton, Gloucester, engineer, and William Craymer, of Bristol, carver. Feathering and adjusting screw propellers to be used in propelling vessels.

2479. Alfred Vincent Newton, of Chancery-lane. Improvements in rock-drilling machinery. A communication.

2480. James Jackson, of St. Seurin-sur-l'Isle, France, steel manufacturer. Improvements in the manufacture of tyres for railway and other wheels.

2481. John Chubb, of Saint Paul's Churchyard. Improvements in the construction of iron safes and doors for strong rooms.

2482. Boydell Robinson, of Gilbert-street, Grosvenor-square, laceman. Improvements in the bodies and jackets of ladies' dresses.

Dated September 26, 1857.

2484. Joseph Lewis, of Salford, engineer. Certain improvements in machinery or apparatus for making bricks, tiles, and other similar articles, and also in the machinery for preparing clay for the same manufacture.

2485. Richard Watson, of Galashiels, N.B., manufacturer. Improvements in weaving.

2487. George Speight, of Woodbridge-street, Clerkenwell, hair worker. Improved head plaits, foundations for wigs, bracelets, and other plaited ornaments for personal wear.

2488. Thomas Crick and John Throne Crick, of Leicester, boot manufacturers. Improvements in the manufacture of boots, shoes, and slippers.

Dated September 28, 1857.

2489. James Broad, coach spring and carriage lamp maker, of Drury-lane. The construction of a lamp with two burners and two wicks to produce one flame or two flames according to its regulation by generation of gas from all and every sort of oils or spirits, naphthas, resinous and tarry substances, and also from petroleum or earth oils.

2491. George Roby, of Wigan, Lancaster, shoe maker. Improvements in machinery or apparatus for raising water and employing the same as a motive power.

2495. Edouard Marcellus Blount, of Paris, gentleman. Improvements in distilling.

Dated September 29, 1857.

2497. Emile Albert Lejeune, of Paris, manufacturer. An improved crupper. Partly a communication from J. J. Brunessaux, of Paris.

2499. William Bayliss, cable manufacturer, of Monmore-green, Wolverhampton. Certain improvements in the manufacture of chain cable.

2501. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. Improvements in raising and lowering weights and bodies in mines, and other like places, in ventilating mines, and other like places, and in extracting water therefrom. A communication from M. Trautmann.

2503. John Charles Pearce, of Bowling, York, engineer. Improvements in apparatus used in hot pressing, and in the means of manufacturing parts of such apparatus.

2505. Samuel Clark, of Albany-street, Regent's-park. Improvements in apparatus for burning night lights or mortars.

2507. William Edward Newton, of Chancery-lane. Improved apparatus for measuring gas. A communication from A. Nobel, of St. Petersburg.

Dated September 30, 1857.

2509. John Henry Johnson, of Lincoln's-inn-fields. An improved hand saw. A communication from J. Gorham, of Bairdstown, U.S.

2511. George James Wainwright and Charles Timothy Bradbury, of Dukinfield, Chester, cotton spinners. Improvements in machinery or apparatus for making or manufacturing tubes or partial tubes used in spinning and doubling machinery, and for holding the same ready for use, part of which machinery is applicable to making pens, pen-holders, and similar purposes.

2513. Edwin Thompson, of the Phœnix Foundry, York, and William Joseph Nicholson, of Queen-street, York. An improvement in railway switches.

2515. Joseph Firth, of Crosland Moor, near Huddersfield. An improvement in metallic pistons.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

2558. Jonathan Parker, of Maine, United States. Certain new and useful improvements in machinery for grinding card cylinders for carding engines. Dated October 6, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," October* 13, 1857.)

1526. E. Alexandre. Improvements in the manufacture of organs and other similar musical instruments.

1553 N. Bentley and J. Alcock. Improvements in machinery or apparatus for forging and stamping metals, which is also applicable to pile-driving, crushing ores and seeds, beetling and fulling woven fabrics and other similar purposes.

1555. J. Stevens. Improvements in water gas meters.

1558. P. E. Chappuis. Improvements in stereoscopes.

1572. V. Blumberg. Improvements in the manufacture of billiard tables.

1577. T. L. Boote and R. Boote. Improvements in the manufacture of ornamental pottery, and articles made from clay and other like plastic materials.

1579. R. Roberts, W. Shaw, and S. Shaw. Improvements in machinery for weaving and folding fabrics.

1590. T. G. Shaw. Improvements in bedsteads. A communication.

1592. H. Powers. An improved machine for punching, stamping, or cutting metals and other substances.

1601. D. Bethune. Improvements in apparatus for preventing or consuming smoke in furnaces and chimneys.

1605. W. Wright. Improvements in apparatus for annealing glass in ovens.

1606. W. Wright. Improvements in apparatus for feeding fires and furnaces with fuel.

1610. C. A. Kurtz and L. A. Nori. Improvements in extracting the colouring matter from gum lac and other similar substances, and in treating the residues thereof.

1613. R. A. Brooman. Improvements in furnaces. A communication.

1628. T. H. Roberts. Improvements in the manufacture of casks.

1629. G. Sampson, J. Sampson, and E. Ledger. Improvements in means or apparatus for effecting the folding or rigging of woven fabrics.

1634. A. V. Newton. Improvements in the construction and mode of propelling and steering navigable vessels. A communication.

1641. J. L. Clark. Improvements in apparatus for conveying letters or parcels between places by the pressure of air and vacuum.

1672. F. Levick, jun., and J. James. An improved construction of hot blast stove.

1696. G. Marqfoy. Improvements in actuating railway signals.

1713. T. Spencer. Certain improvements in the purification of water and other fluid and gaseous bodies.

1735. W. E. Newton. Certain improvements in looms for circular weaving, partly applicable to other purposes. A communication.

1740. W. E. Newton. Improved machinery for cutting files. A communication.

1769. G. H. M. Muntz. Improvements in the manufacture of metal tubes and axles or shafts.

1871. T. Bowden. Improvements in apparatus for discharging the water resulting from the condensing of steam used in apparatus heated by steam.

1875. J. Alison. Improvements in preparing vegetable substances for feeding animals, and in apparatus for that purpose.

2022. W. Deakin and W. Phillips. Certain improvements in the manufacture of metallic pens and penholders.

2230. F. A. Gatty. Improvements in the manufacture of chlorine and sulphuric acid.

2290. T. Bradford. Certain improved apparatus for washing clothes or articles of wearing apparel, which apparatus is also applicable to churning.

2320. U. Scott. Improvements in machines for cleaning knives.

2381. T. Marsh. An improved piston. A communication.

2404. R. Brown. Improvements in moulding or shaping metals and other materials.

2449. J. Absterdam. A certain new and useful improvement in electric telegraphic cables.

2452. G. J. Worssam. An ink self-supplying penholder.

2480. J. Jackson. Improvements in the manufacture of tyres for railway and other wheels.

2505. S. Clarke. Improvements in apparatus for burning night lights or mortars.

2508. R. Bodmer. Improvements in machinery or apparatus for winding, unwinding, reeling, cleansing, measuring, sorting, weighing, twisting, and doubling silk, and other fibrous substances. A communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1854.

2173. Pierre Etienne Proust.
2186. François Alexandre Nicolas Delsarte.
2191. Charles Frederick Stansbury.
2216. George Scheutz and Edward Scheutz.
2222. Jacob Dockray and John Dawson.
2319. George Taylor.

1855.

35. John Henry Johnson.

LIST OF SEALED PATENTS.

Sealed October 9, 1857.

1016. William Smith.
1020. Henry Félix Courenq.
1024. Richard Archibald Brooman.
1031. Josiah Gimson.
1035. Joseph Maurice.
1054. Benjamin O'Neale Stratford, Earl of Aldborough.
1055. Robert Knowles.
1103. Charles Benjamin Normand.
1109. William Thomson.
1137. Charles Etienne Osmont.
1155. André Prosper Rochette.
1157. André Prosper Rochette.
1163. James Caddick, Thomas Hemmings, and David Caddick.
1215. Barnard Barcroft.
1305. Joseph William Schlesinger.
1945. James Heywood Whitehead.

Sealed October 13, 1857.

1040. Augustus Edward Schmersahl.
1045. Charles Barlow.
1048. Robert Hazard.
1062. Robert Knowles.
1067. Bonnet Frederick Brunel.
1070. Jacob Safran.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

J. P. Drake.—We have received your communication, and will endeavour to find space for it in our next.

W. Carroll.—Your communication reached us, but the mode of action of the valves was not explained with sufficient clearness. Can you send us a better drawing and description?

J. Hope.—The plan you suggest for lowering the telegraph cable has been suggested before, but is not, we believe, very favourably entertained.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1785.] SATURDAY, OCTOBER 24, 1857. [PRICE 3D

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

MESSRS. SPARKE AND SPARKE'S IMPROVEMENTS IN SAWING MACHINERY

Fig. 1.

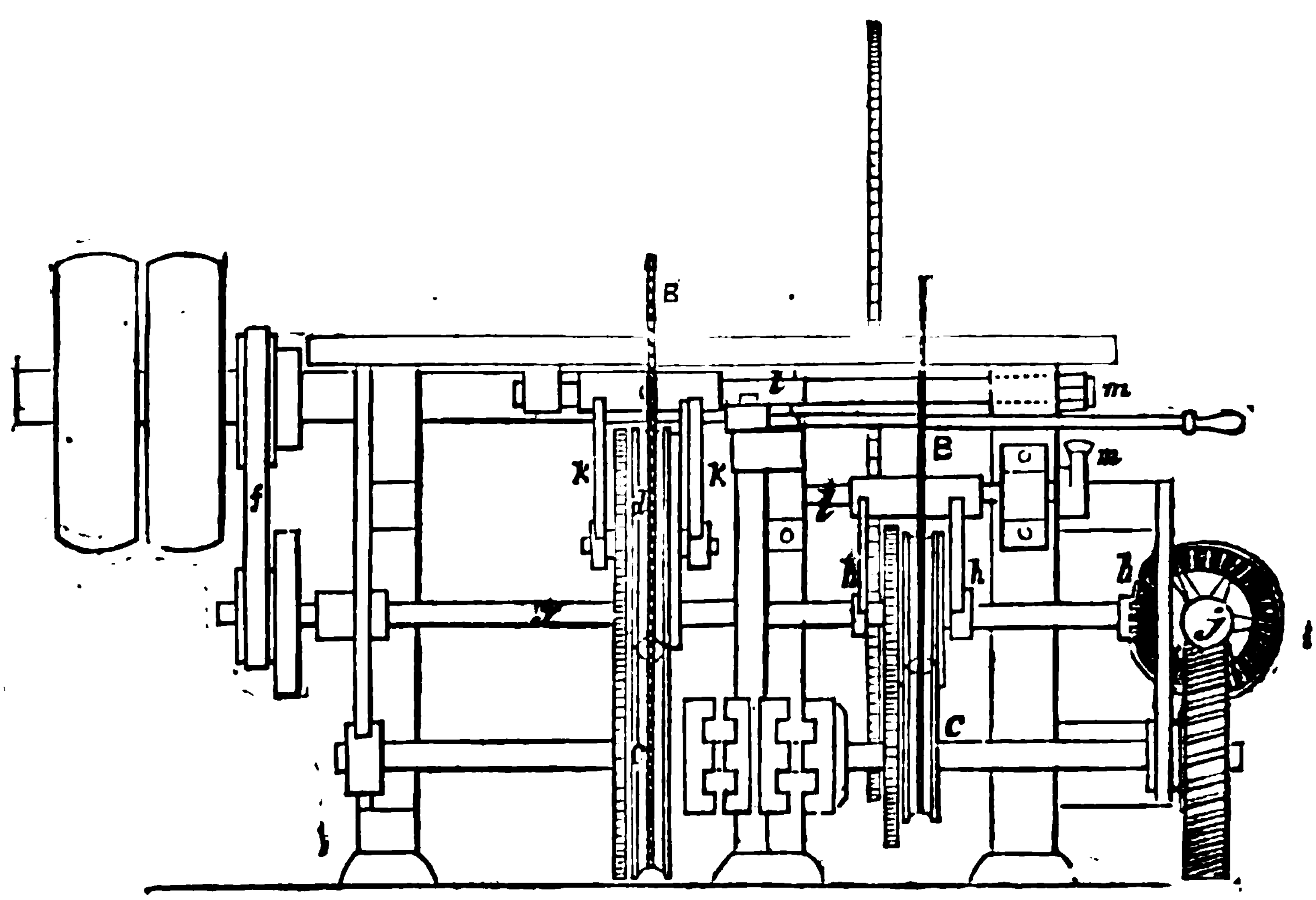
Fig. 2.

MESSRS. SPARKE AND SPARKE'S IMPROVEMENTS IN SAWING MACHINERY.

MESSRS. SPARKE and Co., of the Thorn-lane Foundry, Norwich, engineers and iron-founders, have patented the following improvements in sawing machinery. The first part of their invention relates to that part of sawing machinery which is employed to give motion to the timber under operation for the purpose of bringing it up to, and keeping it in contact with, the saw during the cutting, and of withdrawing it from the saw when the cut is completed; and this part of the invention consists in the employment of a chain or rope, one end of which is attached by claws to the timber, and the other end of which is passed partially around two friction rolls or pulleys, one of which is fixed upon a spindle driven by power, and the other is carried on an axle at the extremity of the short arm of a lever, or of the short arms of two similar levers. Upon the same axes as the two friction rolls or pulleys, and rigidly connected with them, are two toothed wheels, which gear into each other, for the purpose of rendering the motions of the rolls or pulleys perfectly isochronous. A guide roll is fitted upon the end of the saw bench for guiding the chain or rope from the timber to the rolls or pulleys.

The second part of the invention relates to the mode of driving reciprocating saws, or saws which act upon the material to be cut by successive strokes, and consists in the employment of a crank arm, the length of which may be varied when it is desired to change the length of the saw's stroke, such crank arm carrying at its extremity a pin which works

Fig. 3.



in a transverse slot in the frame of the saw, and which, as the crank arm rotates, imparts the necessary reciprocating motion to the saw. Instead of a crank arm and pin, a disc and adjustable pin, or other equivalent contrivance may be employed.

The accompanying engravings represent the manner in which the invention is carried into effect. Fig. 1 is a side view, fig. 2 a plan,. and fig. 3 an end elevation of a circular sawing machine fitted with the improved apparatus for bringing the timber to be cut up to the saw, keeping it in contact with it, and withdrawing it from the saw when the cut is completed. The machine is formed with a frame, parts of which run on rails; and the tree, A, to be cut, is attached thereto by dogs. This frame, together with the circular saw, is formed and fitted as usual, or in any other suitable manner. In this machine two ropes, B B′ (the latter shown partly in dotted lines), are employed, the former for imparting a forward motion to the timber, A, and the latter for giving it a backward motion. The

rope, B, is attached at one end by a claw to the timber, A, and is thence led over the roller, *a*, down under a pulley, *c*, and, ascending on the other side of this pulley, passes under and then over a second pulley, *d*, and then falls slack to the ground. The lower pulley, *c*, is mounted upon an axle driven by a worm wheel, *e*, to which motion is transmitted from the saw spindle through a belt, *f*, a spindle, *g*, a bevel pinion, *h*, a bevel wheel, *i*, and a worm, *j*. The upper pinion, *d*, is mounted upon an axle carried by the levers, *k k*, which are fixed on a rocking shaft, *l*. By raising or depressing the lever, *m*, which is fixed on this shaft, *l*, the amount of friction exerted upon the rope, B, between the pulleys, *c* and *d*, may be increased or diminished in such manner as to regulate the speed with which the timber is moved, either by allowing the pulleys, *c* and *d*, to slip more or less within the rope, B, or by nipping them tightly against it. A cog wheel is mounted upon the axle of each of the pulleys, *c d*, so as to gear into each other, in order that the pulleys, *c d*, may be made to move with the same surface speed. The rope, B′, by which the timber is run back from the saw, may be acted upon by an arrangement of apparatus similar in construction and in action to that just described, the pulleys being made larger in this case, to give it a greater speed, if desired.

ON SUBMARINE TELEGRAPH CABLES.

BY J. BODIE, R.N., MASTER OF H.M.S. "AGAMEMNON."

I must preface the following remarks by observing, that all the statements are deduced from personal observation, and the calculations for specific gravities obtained from the pamphlet on "Deep Soundings in the Mediterranean," by Captain Spratt, as well as those made by American officers, which are published in Lieut. Maury's excellent work on the "Sea."

Where theory is indulged in, it is to show what is probably the effect of the elements of air and water operating on each other when in great depths, causing the disintegration of foreign bodies, as earths, &c., and their disrupture into small particles, forming mud or sand.

Having been appointed to H.M.S. *Agamemnon*, when that ship was first prepared for the reception of the Atlantic telegraph cable, I have had an opportunity of minutely observing all the arrangements and appliances which it was hoped would ensure the safe deposition of the wire at the bottom of the ocean; and with everyone else, I very much regret the failure of the attempt.

Observing the rapidity with which the cable issued from the *Agamemnon* during some of the experiments, and remarking also the small angle it in general made with the horizon while being paid out from the *Niagara*, I was induced to ascertain its specific gravity, which proved 2952, water (salt) being assumed to be 1026; and also seeing that it generally exhibited an angle of from 11° to 22° with the plane of the sea under nearly any rate of speed of the ship, it was manifest that the cable was unnecessarily heavy; for as soon as it entered the denser medium of salt water (from air), it immediately quitted the slightly depressed line, and formed a more abrupt one towards the bottom, using the sea as an inclined plane. When the ship arrived over deep water (2,000 fathoms), it commenced rushing downwards with great velocity, gradually acquiring so much speed and tension as to bring the strain upon it up to 3 tons!—a strain far greater than could possibly be necessary, as, from the immense size of both the conveying vessels, any undue strain would break even their chain-cables like a cobweb.

It has hitherto been the custom to make all submarine cables with an outer coating of wire rope; and, where the water is shoal, or they are laid in places where the anchor of vessels may grapple them, it is proper that such a coating should be over the gutta percha, to give the weight necessary to resist the action of the waves, as well as strength to withstand the strain of a ship's cable; but in deep water I consider that this ponderosity may be considerably reduced, as any surface agitation from gales of wind can only disturb the waters to a certain depth; therefore any extra weight in a submarine cable beneath that depth is quite useless; and if it were required to recover the cable, that weight would bring such an excessive strain upon the upper part, as it passed over the sheaves when coming in board, as would probably cause it to break.

Now, if a submarine cable were covered with hemp-rope instead of wire, the strength would not be so great; but still, in proportion, it would bear much more lifting power, and be more easily recovered from the deep sea.

A five-eighth telegraphic wire-covered cable will bear a strain of 4 tons, and require to lift a positive weight of 25 cwt. out of water two miles deep, besides the nip that such a depth has upon the cable: but

a five-eighth telegraphic hemp-covered cable will bear a strain of 1¾ tons, and require only to lift a weight of 4 cwt. out of water of the same depth.

It is true that the same amount of nip is on both, but it is well-known how much easier it is to drag a comparatively light substance from great depths than a heavy one, as is exemplified by the constant recovery of the twine and cordage used in deep-sea soundings, to many of which lines considerable weights are attached; but there has been no instance yet where wire-covered cables have been recovered from any great depth; in fact, every attempt to do so has carried them away.

Again, the log-line of a man-of-war is generally used from 720 to 1000 times before it is worn out, and each time it is probably hauled in over two or three frictional points; how much more likely then is it that a submarine wire, protected by twelve log-lines as an outer covering, would deposit itself safely on the bottom when only once paid out of a ship, and part of it be recovered to repair any damage of its continuity or insulation.

From the foregoing observations it appears that to lay a cable successfully in the deep sea, there should be three several sorts of cable employed,—viz., that which will have to be subjected to the influence of waves, and the chance of abrasion from anchors, stones, or sand,—a second part which may be affected by a slight agitation of the bottom;—and a third part to be immersed in the deep sea, which should not (of whatever material it is composed,) have a greater specific gravity than 1528, (sea sand), though a gravity of 1234 (common tarred rope) would be quite enough—the latter gravity sinking at the rate of 100 fathoms in ten minutes, (or 2000 fathoms in three hours and twenty minutes,) a rate rapid enough for any purpose of immersion, and ensuring a straight and uniform issue of cable from the ship.

The expense of a cable coated with hempen rope would be about 30 per cent. less than that of one coated with iron; a much greater length could be carried by each vessel; and the risk of kinking would be *nil*, as the service being on the outside would keep the lay in the strands, and give sufficient stiffness to prevent any kinks possibly getting on the cylinder when about to issue into the sea; and by allowing great freedom in its paying overboard, slack enough would remain to compensate for any under currents which may exist in the ocean.

These currents have often been discussed, and what has been advanced relative to their existence appears vague. That surface currents are in constant operation there cannot be a doubt; but that any under current can run with a rapidity that would affect a cable sinking at the rate of ten minutes per 100 fathoms, I doubt very much.

It is manifest that a surface current is constantly setting from the Polar Sea towards the Gulf Stream, as witnessed by the drift of ice, and the wrecks of abandoned vessels that are often seen. To keep up the supply of this surface current, an under current, or rather the whole body of the Atlantic Ocean, must in time reach the Polar Sea; but such an immense mass of water, reaching miles deep by thousands of miles broad, must approach that dreary region very slowly indeed, even if its motion could be called perceptible; thus making not the least obstacle to the sinking of any substance heavier than water; and as the active current does not probably extend more than 50 fathoms, if even so much, below the surface, very little time would elapse whilst the submerged cable was in its influence. The day previous to the cable parting on board the *Niagara*, a surface current was experienced, setting the cable apparently on the quarter of the ship, when, in fact, it was the ship setting away from the cable. This was erroneously imagined to be an under current, and described as such.

In speaking of the currents, and their influence on the telegraphic plateau, it appears the bergs have for ages drifted periodically from the northward towards the Gulf Stream, down the Atlantic in a S.S.E. true direction, gradually melting as they advance to the south, under the influence of a more genial climate and a warmer sea, and depositing their debris of earths and stones in the ocean, wherever these materials may become separated from the mass; thus in the course of time raising the bottom to the depth now obtained, and making an even surface, on which, it is hoped, the telegraphic cable will some day lie.

That the surface of this plateau is generally composed of ooze or mud, may be conjectured from the fact that all light substances brought by the bergs into very deep water and there separated, as they sink, are subjected to an enormous pressure, which causes the water to permeate and disrupt them into minute particles, forming mud or sand. Where denser substances are separated, they, being heavier, sink lower, and form a substratum. Thus in all deep seas we may conclude that the bottom will be of ooze, ready to form a bed for the reception of a telegraphic cable; and if the outer coating of such a cable be formed of hempen rope, it will remain a good protector of the gutta percha for years, and

need not, when once placed, be disturbed for a very long period.

(*To be continued.*)

MR. MILLER'S METHOD OF PROPELLING VESSELS.

The mode of propulsion proposed by Mr. W. N. Miller, paymaster R.N., having become the subject of controversy in our columns, we think it advisable to lay before our readers such remarks on the principle involved therein as may enable them to arrive at a sound conclusion. The description of the apparatus employed given in No. 1780 is sufficient for our purpose. With regard to the principle involved, we will quote Mr. Miller himself, in order that we may do him perfect justice. In his pamphlet, page 7, that principle is given as follows:—

"That water presses on the immersed body of a ship in proportion to the depth of immersion, the draught of water being a column from that depth to the surface, the weight of which is in proportion to its height; *and that the difficulty of displacing water increases with the increase of depth.* As on the surface, the oar presses against the water, and propels with the power given by the rower, minus the power lost in displacement or 'slip,' so diaphragms or pistons worked with engine power in horizontal tubes will also propel by pressing unremittingly on the water in regulated alternations, the propellers returning through an unresisting medium, and the water against which they act following them with the velocity imparted by the weight of the columns of immersion; *for as air imparts power to the travelling diaphragm, in the partial vacuum in the horizontal tube on the atmospheric railway, so must water follow with velocity or power equivalent to the depth of immersion of such tubes, and the nature of the void existing on the other sides of the propellers working therein*: and as a piston, in a horizontal tube placed in the centre part of the bottom of a ship, worked with a rod through a stuffing box at one end of the tube open to the external water, has on each square inch of its area the weight of the column of immersion, together with that of the atmosphere, the water, with this pressure acting as the fulcrum against which the power of the engine is exerted, *it is easier for the ship to be put in motion than for the water, at that depth below the surface, to be displaced*; the tube, fixed in the ship, passes over the periphery of the piston propelling till the length of the stroke of the steam cylinder be accomplished: the full effort of the steam on the area of the steam piston being given as a direct thrust against the external water on the area of the propeller, which, in returning with the steam piston, meets with no resistance, except from any air that may enter from imperfection in the stuffing-box, and consequently brings with it the pressure of the external water following the vacuum, which pressure, as the speed of the steam-piston is limited, and the water would otherwise follow with much greater velocity is (after abating the momentum imparted to the ship, and the rate the pistons are returning) power added to steam power. The ship is slowly put in motion on first starting, but her speed increases with each stroke of the engine, till the resistance offered to the area of her displacement is balanced by the accumulated motive power in the momentum attained, and the vacuum left in the tube of the propeller, during each revolution of the engine, has, in its formation, extracted none of the effective power of the engine in propelling, as it has been only in consequence of the motion imparted to the ship."

The figures given by Mr. Miller, in his letter published in No. 1784, are intended simply to supply examples of what is meant in the above extract.

Now we have no hesitation in saying that, according to all the known laws of physics and mechanics, no ship could be made to move by such a mode of propulsion as that here proposed. Our correspondents, "Mechanic" and "Screw," are right in the view they have taken of this question, however they may have been deemed to fail in courtesy in pressing that view. The passages which announce unsound principles of physics and mechanics we have put in italics in the preceding quotation. Mr. Miller, in estimating the work done in the back stroke, has quite overlooked the circumstance that, in his system, the area of the propelling piston is at the same time an integral part of the surface of the ship.

If a cylinder be supposed to be described with this area as a base, and to intersec the bows of the ship, the pressure on the area of the surface of the portions of the bows so intercepted is (in the state of rest) counterbalanced by the pressure on the propelling piston. It is in the state of rest only, and in estimating the amount of the *statical* pressure only, that any question of the depth can arise. As soon as motion takes place, which must be by the motion of the piston becoming greater or less than that of the vessel, the pressure on the piston is increased in the forward stroke, and diminished in the back stroke, by a quantity proportional to the square of the relative velocities of the piston and vessel. This is a well-known law, which rests on sound deduction from the physical conditions of a fluid.

Now, the propelling force is that due to this excess or defect, and is therefore positive in the forward, and negative in the backward stroke, and of equal amount in the two. Hence, in a complete forward and back stroke, the same piston does on the whole no work. This is true for all the pistons, however placed relatively to each other. If all the pistons were to make their forward and backward strokes together, the effect would be that the vessel would alternately advance and recede through the same distance. If they were placed as proposed by Mr. Miller, so that each should be one quarter of the whole stroke in advance of the one next to it, so that two should be advancing and two receding at the same time, we beg leave to doubt whether any motion of the vessel could be obtained at

all. In what we have said, it is assumed that with the same relative velocity in different directions, the addition to, and subtraction from, the statical pressure is the same. It might possibly turn out, on experiment, that the addition is greater in some slight degree than the subtraction; in which case the vessel will be propelled with the pressure due to this difference; that is, it would have a slight forward motion, instead of standing absolutely still. However, there is a much greater show of reason in our assumption than in Mr. Miller's.

The proposal in question is, in our opinion, another of those numerous cases in which an inventor is drawn into irremediable error by an inadequate acquaintance with the first principles of mechanical and physical science. It is true enough that the inventive power is inborn, and cannot be implanted by a study of the laws of science. Neither, on the other hand, can it be removed or lessened by this study; and every day's experience proves that a vast amount of expense and bitter disappointment might be avoided if all inventors would first seek from the proper sources to obtain an adequate knowledge of scientific principles; or, failing this, would submit their conceptions to the judgment of some sufficient authority (which, by-the-bye, they sometimes do), and would also (which is what they will not do) abide by that judgment. The counsel given to Mr. Miller (somewhat roughly, perhaps) by "Screw," we also tender him; and, if he is wise, he will be content with his present loss of fifty pounds.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I shall not, I presume, be expected to write an answer to Mr. Miller's curious letter in your last number; a word or two of rejoinder will be sufficient.

In my letter (as in that of your correspondent, "A Mechanic"), a simple appeal was made to commonplace scientific knowledge, and the force of that appeal is doubtless understood distinctly by the majority of your readers. Mr. Miller is, apparently, among the few who never studied "mechanics," and therefore sees no force in it, but talks—I would rather say, babbles—about a "vacuous vessel," an "irresistible fulcrum," and other similar nonsense. Mr. Miller's use of figures and his attempt at calculation are too absurd for criticism, and will mislead no one.

In writing in this manner I still, I am aware, expose myself to the charge of overestimating my own "discernment;" but while Mr. Miller is the only one who makes the charge, I shall not care to rebut it. He talks about our attacking him with "closed visors." What nonsense! We did not attack him at all, but merely stated well-known facts for his benefit; and so long as we get good information and advice, it cannot matter who gives us them.

Finally, let Mr. Miller understand that his vindication of his invention is as worthless as the invention itself, and that is not worth sixpence.

I am, Gentlemen, yours, &c.,

Screw.

STEAM BOILER FURNACES.

Dr. Playfair has addressed the following letter to the *Society of Arts Journal*. The report to which it refers appeared in the *Mechanics' Magazine* of Oct. 3, 1857 :

"In your journal appears an interesting report by Messrs. Longridge, Armstrong, and Richardson, on the consumption of smoke in marine boilers. They obtained by their experiments an evaporated value of 10 lbs. to 12 lbs. of water for 1 lb. of Newcastle coal, and they draw attention to this fact as serving 'to correct an error of opinion which has resulted from the published reports on coal suited to the steam navy,' by Sir Henry De la Beche and myself. We found under the boiler used, in the comparison of different coals, that 1 lb. of Newcastle coal evaporated about 7½ lbs. of water. In the reports cited, we explained that we did not profess to give the absolute values of the coals tried, but only the relative values under like conditions of experiment. In fact, attention was drawn to the unfitness of the small Cornish boilers used to give absolute results, and it was shown by us on trial to be about 20 per cent. inferior to a good Cornish boiler, and it would not surprise me to learn that it was 50 per cent. below a multitubular one. Every separate observer, operating with varying boilers, must obtain differing absolute results. Smeaton found that 1 lb. of Newcastle coal evaporated about 7¾ lbs. of water, and Watt obtained the result of 8¼ lbs. In the recent Lancashire experiments, rather less than 7 lbs. were converted into steam.

"No better men than those engaged could have been selected to make the recent experiments at Newcastle; and, so far as these are described, they appeared to have been made carefully, and with judgment. The multitubular boiler employed was, no doubt, better fitted to obtain a maximum absolute result than the boiler of our relative trials. The theoretical maximum of evaporative value for Newcastle coal is about 14 lbs. of water to 1 lb. of fuel; and the less waste of heat there is in the boiler, the more nearly will this theoretical possibility be reached.—Lyon Playfair."

Records of Mining and Metallurgy; or, Facts and Memoranda for the Use of the Mine Agent and Smelter. By J. ARTHUR PHILLIPS and JOHN DARLINGTON. Illustrated by Wood Engravings. London: E. and F. N. Spon, 16, Bucklersbury. 1857.

THIS work contains first an elaborate historical notice, and then a series of chapters on Hydraulic Machinery, Steam Machinery, Steam Boilers, Superheated Steam, Crushing and Dressing-Machinery, Assaying, Recent Metallurgic Processes, Boring, Mining as an Investment, the Joint-Stock Companies' Act of 1856, Mining Economy, and Copper Ore Statistics, together with Miscellaneous Rules and Tables, and a Supplementary Paper on the Joint Stock Companies' Act of 1857. The object of the writers has been to make a convenient book of reference, and this they have done very efficiently. The Historical Notice contains the results of considerable research, and a large amount of tabular information respecting the mineral produce of this country. The chapters on machinery of various kinds are very fairly done; but no evidences are given of any remarkable ability on the part of the writers to afford new information, or to put known information into a complete though condensed form. In the chapter on Boilers there is a little too much of Mr. Armstrong—enough, that is, to show that the authors are not very sagacious in their selection of authorities. In the chapters on Recent Metallurgic Processes, the specifications of Plant, Martien, Bessemer, &c., are given, together with a few newspaper extracts, and a meek expression of trust that Mr. Bessemer will, by-and-by, do more than he has yet done. This chapter, however, also contains very good descriptions of Sinding's process for precipitating copper, Parkes' process for desilverizing lead, and some other papers well worth possessing. Upon the whole, the work is very well prepared, and will be found extremely useful to many besides miners.

INSTITUTION OF ENGINEERS IN SCOTLAND.—The first meeting of the session, 1857-8, of the Institution of Engineers in Scotland will meet in the Philosophical Society's Hall, George-street, on Wednesday, the 28th October. The admission of new members will be proposed, and the president will deliver an introductory address, in the course of which the subject of Mr. Whitworth's proposed system of decimal divisions and gauges will be introduced, with the view of its recommendation by the Institution being discussed. A paper will be read "On Acadian Iron," by Mr. J. V. N. Bazalgette. Specimens of Acadian iron will be exhibited. The secretary will read an abstract of the "Report of Experiments made at the French Imperial Arsenal of Cherbourg, on Beaufumé's Gas-flame Furnace," by M. Guesnet, Admiralty Engineer, and M. Sochet, Director of Naval Construction—communicated to the Institution by the Count de la Taille des Essarts—of which a full abstract was given at page 366 of our last number.

IMPROVEMENTS IN THE MANUFACTURE OF IRON AND STEEL.

MARTIEN, BESSEMER, MUSHET, AND UCHATIUS, AND THEIR PROCESSES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—As the discoveries of Mr. Bessemer and others attracted, some time since, a large share of public attention, it may prove interesting to many of your readers to peruse a few remarks on this subject, which tend to throw some light upon matters of great importance, not merely to manufacturers, but to the world at large. It is not for me to determine the respective patent rights of Martien and Bessemer, but I will at least attempt to do them justice as to the merits of their invention.

Martien, then, appears to have originated the great discovery that pig iron can, whilst in the fluid state, be purified from carbon, silicon, and some other of its alloys, by forcing currents of air under it, so as to pass through and pervade its liquid particles. Martien, however, overlooked the grand feature of his discovery, namely, that when air, either cold or heated, is thus forced through a molten mass of cast iron, the temperature of the mass is rapidly raised, not so much by the combustion of its combined carbon as by the deflagration of the iron itself; and that when the carbon has been all or nearly all dissipated, the temperature increases to an almost inconceivable extent, so that the mass when containing only as much carbon as is requisite to constitute with it cast steel, and even when deprived of this small portion of carbon, and existing in the state of semi-malleable iron, still retains a perfect degree of fluidity. The announcement of this fact is the sum and substance of Bessemer's discovery. Perfectly simple in itself, it had been before the metallurgical world, both practical and scientific, for centuries; but it was reserved for Bessemer to develope the principle to its fullest extent; and, in fact, though all the world knew that heated iron would deflagrate in the air, with an intense generation of heat, no man but Bessemer had ever dreamed that blowing cold air through melted iron, without the aid of additional fuel, would raise the temperature of that iron to a degree never before witnessed in metallurgical operations. A more brilliant and surprising discovery was never before published to the world. Let those who cannot appreciate a great invention, and have neither the energy, the talent, nor the perseverance to carry it out, condemn this invention; the inventor may rest assured that it will one day be acknowledged, and ranked, not with, but above the

great discoveries of Cort and Neilson. Bessemer's process removes the carbon and silicon from the cast iron operated upon, and when the blast is properly adjusted, and a sufficient mass of metal is operated upon, the waste need not exceed 20 per cent., the remaining 80 per cent. being a kind of semi-malleable iron in a perfectly fluid state. When cast into blooms or ingots, and cooled, it is found that, according to the nature of the pig iron from which they have been prepared, these ingots possess either a bright, crystalline, and cold short texture; or they present a granulated fracture, exhibiting the cold, tough characteristics of the semi-steel described by the late Mr. Mushet, at page 525 of his work on iron and steel. In either case these ingots prove hot-short when forged, and, except at a high welding heat, they possess but little coherence. At the welding heat they may be rolled or drawn into bars, and these bars may be cut and piled, and be then again drawn into bars; but the original characteristics of the product are very slightly, if at all, modified by these operations. The Bessemer iron is, therefore, not commercially valuable. The inventor had succeeded in expelling the carbon and silicon from cast iron, but the sulphur and phosphorus remained; and, worse than these, a portion of oxide of iron became diffused through the mass, and imparted to it the inveterate hot short quality which no subsequent operations could expel. In other words, oxide of iron may be alloyed with purified cast iron, whilst the latter retains its fluidity, but cannot be removed or altered after the iron has assumed the solid state; so that in operating upon pig iron, which contained only small doses of sulphur and phosphorus, the only hindrance to the complete success of Bessemer's splendid discovery was the presence of the disseminated oxide of iron, and that a new oxide, not known or recognised by chemists, who indeed, as a general rule, know little or nothing about iron and its Protean habitudes.

Bessemer failed, however, to surmount this seemingly trifling but really formidable obstacle, and the consequence was, that though he had made one stupendous step in advance of the whole metallurgical and scientific world, he nevertheless lost all credit, because he was unable to take the second step towards complete success. He was, and I suppose is still, condemned as a visionary schemer, who has advanced a fallacious idea, and has failed to carry it out. So, however, says the voice of the many, which, I need hardly observe, is usually the voice of a zany.

The Bessemer discovery being thus, at least for a time, shelved and arrested in its progress, it seems to have occurred to an individual of the name of Mushet that if fluid metallic manganese, with or without an accompanying alloy of iron and carbon, could be presented to the fluid Bessemer iron and alloyed therewith, whilst both retained their fluid condition, that a portion of the manganese thus alloyed would, from the powerful affinity of that metal for oxygen, unite with the oxygen of the oxide of iron disseminated through the fluid Bessemer iron, and pass off as slag, leaving the mass free from the obnoxious oxide of iron, and removing the hot short quality of the iron. At the same time, by restoring a portion of carbon to the purified mass, the mixture would become steel, free from any red shortness, and capable of being extended into sound and marketable bars. Mushet carried his ideas into practice, and with success. I have seen bars of steel thus produced from coke pig iron which possessed incredible toughness, and from which tin plates were made, of a quality superior to those manufactured from the finest charcoal iron. The blooms passed the rolls at the usual temperature without a flaw or crack, and perfectly free from blemishes. These tin plates, some of which I have seen, were rolled by Mr. Thomas Allaway, the eminent tin plate manufacturer at Lydney, a station on the South Wales Railway. I have seen also miners' tools, such as chisels, mandril points, and hammers, made from this steel, and all of excellent quality, whilst the steel welds and works as readily as the best double shear. Mushet patented his discovery, and it has been before the public for half a year or more; and yet not one print, literary or scientific, has condescended to notice it. So it lies a spark amongst dry faggots, that will one day light up a blaze which will astonish the world when the unfortunate inventor can no longer reap the fruits of his life-long toil and unflinching perseverance.

I say literally, "light up a blaze," for when the fluid metal from several blast furnaces is run into one gigantic purifying chamber, and there purified by high pressure blast forced through the molten iron till the mass is converted into a seething lake of liquid semi-malleable metal, the spectacle thus presented will prove to be one of the grandest sights ever witnessed, and when the semi-malleable but still crude metal shall receive its proper dose of iron, carbon, and manganese poured into it, from a separate blast furnace, and the crude mixture shall at once become, as by magic, cast steel of excellent quality, then will the triumph of the inventor's process be complete. Henry Bessemer will then get credit for his despised process, and Robert

Mushet will be remembered for his invention, which at present is not deemed worthy of any attention whatever.

I now come to what is termed the Uchatius process, but which would be more properly designated as the process patented by Uchatius. The process is a beautiful one, and, under certain conditions, a very valuable one; but the patentee has, like Mr. Bessemer, come before the public with a half-fledged process. I have naturally worked a little upon the atomic plan of steel making, and my experience is this:—With good charcoal pig iron and pure ankerite, a good serviceable cast steel may be produced, and the pots will stand one round pretty well, unless the quality of the steel be very soft, in which case it will be found no easy task to pour the steel over the edge of the pot, as its sides, just above the metal, will be found garnished with a number of eyelet holes, more curious than pleasant to behold. At the second round, the sides of the pot and its contents usually vanish, the former retiring amongst the clinkers upon the fire bars, and the latter descending into the cellar, and refreshing the cinders beneath with copious showers of granulated steel. This destruction of the melting pots is the only drawback to the success of the process, when charcoal, pig, and pure ankerite are used. This, however, like the oxide of iron in Bessemer's process, is a fatal drawback, and until Captain Uchatius can remedy it, he has something to learn. When coke pig iron is operated upon, matters become tenfold worse, for the large quantity of slag in the iron half fills the pots and eats its way through the sides at the second or third fire, and though the ingots obtained can be drawn into bars, and the bars even welded, yet the steel cannot be tempered so as to possess any useful properties, as a tool, or cutting instrument of any kind. If we attempt to save the pots by making high steel, the steel cannot be tempered; and if we try to make steel which can be tempered, we destroy the pots.

I cannot say that I sympathise with Captain Uchatius's shortcomings as I do with Bessemer's, because I think he had the opportunity of availing himself of experience which would have shown him how to avoid

" the troubles which environ
The man who meddles with *hot* iron."

An erudite abbé, M. Pauvert, has since patented several processes for filling, as it seems to me, the melting pots with all sorts of alkalies and earths, packed in the interstices of the charge of metal, and which will infallibly hasten the destruction of the pots themselves, and utterly debase and destroy the quality of the steel.

Σιδηρος.

DRAKE'S IMPROVEMENTS IN CANNON.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In placing before your readers such of my inventions as may prove of service to the state, I feel assured my motives will be understood, and ultimately appreciated by the government, better than they have up to this date; and I humbly hope no mistaken notions of economy or injurious influence will longer be permitted to keep in hopeless abeyance for another thirty years improvements of a class which every day's experience clearly tells us it is our interest to encourage.

Prejudice, that insuperable barrier to improvement, has had no small share in the public department in keeping back the required changes of the day; but it has lately given way at Woolwich, in a form, by the purchase of guns from America, which, if consistently encouraged at home, will produce results to England nationally above all other countries, which the government will not have to regret. There is no mysterious principle involved in the construction of cannon beyond what the most common-place observer may comprehend, and it is to its mechanical arrangements and the adequacy of the material employed that we have to look for perfection. A gun is simply a tube intended to project a destructive missile in any required direction, and should be adequate in strength and form to discharge this duty with facility, and free from danger to those who use it. Its usual form is indeed simple, but too much so to be of that utility which it may be made, as it admits of no other loading than at the muzzle, which is attended with danger and difficulty in more ways than one; and it was this, as I observed in my original communication, which induced me to see how far the primitive gun was capable of being improved, and my first improvement commenced in 1829, as previously stated. My efforts have been continuous and progressive, and the example published in a previous number is one out of many which I have invented to increase its destructive power with rapidity; but, although it is not so simple as the primitive gun, it is as free from complication in its parts as it can be efficiently made.

The gun I now send you is also one out of a great number of a class which I call direct breech-loading, as it is loaded in a line with the bore through a fixed breech, which forms a part of the stock or carriage on which the gun rests, and is rigidly secured. It has a shifting or working breech, which cuts off the communication between the fixed breech and the gun, working ver-

tically or horizontally in a slot of sufficient substance to resist any force or impact to which it may be subjected; and the tube, which is a regular 32-pounder of 6 ins. calibre, with the breech bored through, is strengthened by a wrought-iron band driven or screwed on a seat prepared to receive it with straps, which secures it to the stock carriage as described; but as the charge is exploded in the usual position, and not in a detached chamber, the projectile is consequently limited to its original weight, and all the present proved guns may be converted to this principle with an increased range, gaining about two diameters of the shot in the length of the bore.

As the gun is not required to recoil for loading, it is mounted on an inclined platform, so as to return to its firing position by its weight; and as the men will only have to attend to its training, loading, and firing, one-half the usual number will be sufficient to keep up a continuous fire at the rate of three (if not four) to one, with the common battery gun which is loaded at the muzzle; at least, this is the opinion of practical men, which, from my personal experience, I believe to be strictly in keeping with fact. The steel working breech is slightly tapered, to enable it to work freely and fit close against the back of the charge; and should it by any possibility get fixed, the gun can be loaded as usual, which, for the time, will deprive it of the advantages of breech loading, by placing it on a par with the original gun. Prejudiced and opposed to breech-loading cannon as the President of the Committee of 1854 was when we met, I am bound to say, from the five experienced senior officers who composed that committee, both Dr. Drake and myself received the most marked attention; and the discussion on the various plans we placed before them detained them one hour and a half beyond the usual time of sitting.

It must be regretted that, from one unforeseen circumstance and another, and the change which took place in the War Department from the Duke of Newcastle to that of Lord Panmure, which changed the committee also before we could again appear before them, all our exertion was lost; and I have every reason to believe but for this, the American gun, which was subsequently brought under notice by Lord Panmure, would never have been selected; for although the previous Chairman of the Committee, General Chalmers, was opposed to my breech-loading guns, which had the slot cut through the gun the same as the Swedish guns then at the proof department, he was not opposed to the detached breech-chamber principle, which evidently gave him satisfaction when we described its advantages fully; but, as before remarked, our plans were never reported upon by that committee.

When we came before the succeeding committee, from the chairman of which we also received gentlemanly attention, things had so altered from the confused state of the war and the corresponding political changes, and enormous increase of subjects before them, that not the shadow of appropriate investigation was open to us; but on this I am not inclined to offer any remark calculated to prevent the revival of that feeling which, for the good of the public service, I wish to see restored.

Lord Panmure's committee has done much in surmounting the prejudices which stood opposed to breech-loading guns, and if it could recommend with confidence the purchasing of American guns, we have a right to presume that it can see no difficulty in recommending a trial of the one lately described, or the one now submitted.

The advantages and mechanical superiority of the former over those guns lately imported are too clearly defined and approved to cause it to be neglected by the Government with any degree of satisfaction to practical men and the public; and I regret that it is not in my power to supply the example gun, or I would do so with pleasure, and with confidence of success.

I am, Gentlemen, yours, &c.,

JOHN POAD DRAKE.

London, Oct. 12, 1857.

Description of gun.

Fig. 1 is an elevation of the gun mounted, with the shifting or working breech lifted for loading, and the shot, showing the direction in which it is placed and pushed to its relative position for firing, when the working breech is lowered and the gun fired through the breech in a line with the charge, or in the usual way. A, cast iron 32-pounder gun with the breech bored through and the trunnions taken off. B, fixed or permanent breech bored through in a line with the bore of the gun, through which the gun is loaded. It is cast in one with the carriage, C, of sufficient substance and strength to resist the shock of firing the gun. D, wrought-iron band of 2½ inches thick and 12 inches broad, to strengthen the breech end of the gun, with side straps to tie the gun to the carriage, C, through which the ties are bolted. E, wrought steel working breech, to cut off the connection between A, B, and tapered slightly at the back to work freely and to keep the parts in close contact. It may be made as described, or of various forms, cylindrical, D—slide form, or prismatic; and the slot in which it works may be cut entirely in the gun clear of the

breech, B, or half way in each as shown, whichever will make the best joint. F, cast iron quoin for elevating and depressing the gun acting the same as if placed under the breech in the usual way. The original weight of the gun is 56 cwt. Ditto working breech, 90 lbs. Total weight of gun when mounted, about $5\frac{1}{4}$ tons.

Fig. 2 is a plan section of gun mounted, showing the charge and shot as loaded with

Fig. 1.

Fig. 2.

the breech, E, in close contact with the wooden base of the cartridge, introduced to reduce the impact instead of a copper breech plug, and to prevent danger by friction in working the breech, E. In loading the gun, the wad is to be first introduced by a gauge ramrod, when the shot and then the cartridge follow, the shifting breech key, E, compressing the whole by acting like a wedge against the base of the cartridge. Should the working breech get fixed, which is next to an impossibility, as the explosion will prevent it, the gun is to be loaded as usual at the muzzle. It is started by an iron lever at the back, when two men, one on each side of the gun, can raise it clear of the bore, while two men will be sufficient to attend to the loading; and, as there is but one working part to attend to—lifting and lowering, E—continuous firing may be kept up with rapidity. The platform is inclined to allow the gun to return to its firing position through the embrasure, by its own weight, as it is not required to recoil for loading like the common gun. The gun is so balanced in mounting as to allow it to be trained with the facility of a field gun, consequently one-half the number of men will be sufficient to serve it for general purposes.

J. P. D.

THE WAVE LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

Gentlemen,—It is vexing, because unprofitable, that any one's time and your space should be occupied in removing misapprehensions which, with ordinary care on the part of the objector, he need not have entertained. It pleases Mr. Moy to be "astounded" at my assertion "that no alteration in the construction or form of a vessel will enable us to obtain additional speed without additional power," because he chooses to understand me as speaking, not of the same vessel, but of vessels of different build. He might well say that I had contradicted myself if I had inadvertently expressed so absurd an opinion. He ought to know that, in propositions of this kind, it is always assumed that all the conditions of the problem remain the same, except in the particulars with respect to which it is avowedly stated they vary; and in the present case speed and power were only so referred to, as the context and the remaining portion of the sentence not quoted yet more unequivocally established.

The purport of my animadversions on Mr. Moy's British Association paper was to show that it was a fallacy to suppose that any *practical* improvement in shipbuilding would influence the above asserted relation of power to speed (the vessel of which the speed varies being of course the same) although admitting at the same time

that it was not a mere truism, or an unalterable condition in the nature and necessity of things, that additional speed in such case demanded additional power, seeing that if we could make a vessel skim the water instead of dividing it, and so reduce resistance to the nature of friction, more speed would not have to be purchased by more power, provided only that we measure power by space, which, in the case of steam navigation, is the practically true and useful measure, and not by time, which is the proper measure of the engine. Vessels could then go skimming from port to port with the same expenditure of power for the voyage, whatever their velocity, except only as atmospheric resistance would influence the result.

Now Mr. Moy, in calculating the effect of a certain improvement in the form of a vessel, went on the supposition that fluid resistance, like that of friction, is a constant quantity under varying velocities, inasmuch as he made it out that the steamer so improved (with a bow of double the length) would go from port to port with the same consumption of coals, although the speed should be doubled; consequently, he either indulged in the fallacy of supposing that, even without change of form, increased speed can be got without an increase of power (although we should allow him to measure power by space), or else his steamer must be supposed to skim the water instead of dividing it, and so encounter only a constant resistance; under which impracticable condition he certainly would be correct in his conclusion and estimate of power, and what is stated above as a fallacy would no longer be such. He may choose which horn of the dilemma he may think most pleasant to himself; but I should conjecture that he is not yet quite prepared to construct *a skimmer!* As to *duty*, he certainly does misapprehend its meaning, whilst he continues to include in it the element time.

Allow me to take this opportunity of remarking, that the prevailing discordancy of opinion as to whether power in steam navigation is in the ratio of the cube or of the square of the velocity, arises from not attending to the two distinct measures of power, time and space, and from not assigning to each its appropriate subject; and this confusion of ideas will continue whilst mathematical teaching, forgetful of practice in the interest of theory, is so exclusively directed to velocity as an element of power, and so much disposed to ignore the more practical conception of power as being the product of pressure and space. If, for instance, we measure power by time, which we ought to do in reference to the capability and effort of the engine, then it is proportional to the cube of the velocity of the vessel; but if we measure it by its manifestation over a given space, without any respect to the time during which it is exerted, and which we ought to do in reference to that practically important point, the consumption of coals, it is then proportional to the square of the velocity of the vessel; for the time occupied in the voyage being inversely as the velocity, the development of power for a given space falls from the cube to the square, and the expenditure of fuel the same.

I am, Gentlemen, yours, &c.,

BENJ. CHEVERTON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The illustration of the washing tub, and an outrigger wager boat, (the midship sections not being equal) is not a fair comparison of the merits of the wave waterline theory; the only method of testing its advantages, would be the two carefully modelled boats experimented upon by Mr. Moy, as their midship sections were equal; the results asserted to have been obtained I totally deny, as my own private experiments, and those of Beaufoy, D'Alembert, &c., never displayed such decisive results. Now, as Mr. Moy claims such advantages for his theory, allow me to exhibit the progress of naval architecture in the middle of the nineteenth century.

The example of Beaufoy, in his experiments, ought to be the basis of every analysis; the principle adopted by him was to compare the velocity of the various forms with the velocity obtained from the model with the square ends, and I can assure Mr. Moy that the most acute form did not exhibit such results when compared with the flat ends, as those asserted to have been obtained by the advocate of the wave line system.

"Nauticus," in his well-meant advocacy of the square theory, stated, that "a formula of a simple approximate character, by which to test the performances of steam vessels, has long been a desideratum with practical engineers and shipbuilders;" the one proposed by myself for that purpose, in my paper on "High Speed Steam Navigation," at the Institution of Civil Engineers, I acknowledge was empirical, as stated in your strictures upon that Paper.

The formula that I now produce to supply that desideratum, will exhibit the fallacy of the wave line system, and at the same time the theory of the propelling power increasing as the cube of the velocity, and has the authority of Sir I. Newton for its correctness, viz., force$=$A V^2. To reduce

these terms to practice it will be found that by using the well known formula of Beaufoy, the resistance in pounds against a plane one foot square is nearly as the square of the velocity *in feet per second*, that is, for a 4 feet velocity 16 lbs., for 8 feet 64 lbs., and 12 feet 144 lbs. In the employment of this formula the amount of *power* is taken with the balance, and not jointly with *linear dimensions*, namely, the pressure on the ends of the cylinder; consequently the proposed formula will be thus expressed:

$$V^2 \text{ feet per second} = \frac{\text{Pressure on cylinder}}{\text{Midship section}}.$$

Name.	Actual velocity feet per second.	Pressure on ends of cylinder, lbs.	Mid-Section.	Deduced velocity feet per second.	Ratio of Speeds.	Velocity of Piston.
Rattler	17·02	67904	274	15·71	1·08	3·46
Niger 3rd	14·71	82206	426	13·85	1·06	4·18
Rifleman	13·53	28200	175	12·68	1·06	4·03
Sharpshooter	16·53	47854	192	15·79	1·04	4·69
Niger 2nd	17·62	111364	392	16·85	1·04	4·54
Conflict	15·69	94292	402	15·29	1·02	4·53
Ajax 2nd	12·07	116319	807	12·00	1·00	4·00
Plumper 1st	10·76	25322	219	10·72	1·00	2·64
Dauntless, lengthened	17·39	167475	522	17·88	·97	4·00
Fairy 1st	22·51	38777	71·5	23·28	·96	5·16
Megæra	17·30	129110	383	18·35	·94	4·94
Phœnix 3rd	14·77	79322	327	15·55	·94	3·60
Minx	15·44	22160	82	16·43	·94	5·82

In these examples, selected from the well authenticated data supplied by the Steam Department of the Admiralty, Mr. Moy will perceive that the increase of speed in the *Rattler* is only 8 per cent. above what would have been obtained if the vessel had had a perfectly square end, and that the *Fairy*, Her Majesty's yacht, built on the wave line system, is absolutely 4 per cent. less than if the vessel had been shaped with a square bow. I think the tabulated examples are sufficient to prove that Mr. Cheverton's assertion, "that increased speed cannot be obtained without increased power," the midship section being equal, may be accepted as an axiom in the science of naval architecture. As your correspondent, "Nauticus," appears to favour the theory of Mr. Moy, a comparison of the results obtained from "the area of a cross section of the funnel and those of the theory of *inseparable liquid basaltic columns*" *might* be of service in advancing the science of naval architecture. I should scarcely have thought, from the "candour and modesty" displayed in his communication, he should have placed himself in opposition to the universally admitted principle of the midship section being the measure of the resistance a vessel encounters.

With respect to the propelling power increasing as the square or cube of the velocity, I cannot admit that "Nauticus" has fairly represented the opinion of both sides of the question. To be brief, the subject may be thus expressed:—A weight of 16 lbs. and 64 lbs. will sustain a pressure on one square foot in a stream with a velocity of 4 and 8 feet per second; and that the same weights would propel a plane the same dimensions through the water at the same velocity; the subject resolves itself into the following queries, which I beg to submit to the advocates of the cube theory.

The cube theory, to be consistent, implies that the initial resistance against the plane at the above velocities is 16lbs and 64lbs, which, multiplied by the space passed through, forms the basis of that theory. Allow me to ask what velocity would ensue if two equal weights were suspended at the two ends of a line over a pulley? My reply would be, that if 64 lbs. would lift an equal weight at an 8 feet velocity, the 16 lbs. weight ought to lift the same weight at the same rate.

The square theory is based on the following proposition:—"The moving forces which communicate, and the forces of resistance which destroy the motion of bodies in the same time, will be in a compound ratio of the quantities of matter in the moving bodies, and velocities generated or destroyed,

$$\text{or moving force} = \frac{\text{Quantity of matter}}{\text{Velocity}}."$$

The application of this proposition is, that the moving force, or what you have more pertinently termed dynamical pressure, would be for the two weights 4 lbs. and 8 lbs.; consequently the solution of the problem depends upon the truth of this proposition. My reply would be, that the 16 lbs. and 64 lbs. weight, free from the

action of gravity (uniform rectilinear motion), would be more likely to raise 4 lbs. and 8 lbs. than 16 lbs. and 64 lbs. at 4 feet and 8 feet velocity.

In admitting the truth of this proposition it is the sum of the *dynamical pressures* that balances the sum of the resisting forces of the body in motion in a finite portion of time; and the complete establishment of its truth is deducing the speed of vessels by the simple pressure on the ends of the cylinder without the space passed over by the piston of the engine.

This reasoning brings me to admit the truth of the theory of the *conservation of force* that some of our most able physicists are engaged upon; and allow me to add, if that theory is correct, the mechanical equivalent of force must be a *constant quantity;* consequently the problem to be solved is what is its amount for a force of one pound free from the laws of gravitation, my opinion being (based on the previous reasoning) that the mechanical equivalent work of that force is *one pound through one foot in one second of time*, which no mechanical arrangement can either increase or diminish.

I am, Gentlemen, yours, &c.,

ROBERT ARMSTRONG.

11, Mercer's-terrace, Salmon's-lane, Limehouse.

PISTOL PRACTICE BY LADIES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In Allen's *Indian Mail* of the 1st instant is the following extract of a letter by a lady at Bangalore, dated 10th August last:—"I have learned to fire a pistol, and keep one ready loaded. All the ladies are learning to fire." I can safely recommend gun-cotton cartridges to the ladies, because I find that such cartridges never miss fire. It is stated in the *United Service Magazine* of this month, that officers in India have found their revolvers frequently miss fire at the critical moment. I have often had a revolver play me the same faithless trick when charged with the finest and best of gunpowder; the reason is, the *dross* of the exploded powder clogs the *small* nipple of the revolver, whereas the firing of gun cotton never does.

J. NORTON.

Rosherville, Oct. 17, 1857.

MISCELLANEOUS INTELLIGENCE.

IMPROVED WINDOWS. — Mr. W. B. Adams, whose numerous useful inventions are well known, proposes to improve the windows of buildings by introducing two thicknesses of glass into one frame, or by joining the compartments of frames or sashes, or two sashes, to produce the same result, viz., a cellular space between the glasses, containing air, which will materially prevent radiation, and increase the warmth of apartments. The glass is to be fixed in the frames, either in the ordinary modes, or by means of elastic or plastic caulking.

AN IMPROVED SIGNAL AND ALARUM.—Messrs. Langford and Wilder, of Birmingham, the former a manufacturer, and the latter a pyrotechnic artist, have introduced a signal constructed as follows, for producing a violent report and a brief but brilliant light. They take a tubular case (made by preference of metal) open at both ends, the opening at one end being contracted. They drop into the wide end of the tube a short tube or case filled with a certain composition, this composition having a hole through its middle. They next fix in the narrow end of the case a tube passing through the hole in the composition, and drop in the open end of the case a charge of powder, incased in brown paper, tied up, bound tightly with string, and dipped in a composition of glue and red lead. A fuse is put at that end of the charge first dropped in, this fuse being composed of a small case filled with powder and charcoal. The wide end of the case is now closed. They next charge the small tube with gunpowder, filling the top of the tube and the narrow end of the case with another composition. They next place a small vessel containing sulphuric acid on the top of the case, and fasten this vessel down with a metal cap, or by pasting paper over it. A large metal cap may be screwed over the top of the case when it is not wanted to be in readiness for use. When the signal is dropped on the ground, the narrow or pointed end downward, it ignites, a vivid light being produced, which lasts for several seconds, a loud report at the same time occurring.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

WRIGHT, G. *Improvements in stove grates or fire-places.* Dated Feb. 6, 1857. (No. 343.)

This relates to a fire-place combining arrangements for the escape of the smoke, &c., with means of obtaining control over the draught; also in so constructing certain parts as to obtain a large radiating surface, and at the same time conceal the ashes, &c.

POISSON, P. *Improvements in preparing and applying surfaces for painting.* Dated Feb. 6, 1857. (No. 346.)

This relates to surfaces intended as a

substitute for canvas, &c., and may be used in lieu of paper-hangings. The patentee prepares a sheet, skin, or film of layers of paint.

CRICKMAY, C. *Certain improvements in breech-loading guns or pistols for military and other purposes, and which said improvements are applicable, and will admit of being applied to guns or pistols now in use.* Dated Feb. 7, 1857. (No. 351.)

These improvements cannot be described without engravings.

JOHNSON, J. H. *Improvements in casting metals.* (A communication.) Dated Feb. 7, 1857. (No. 353.)

This relates to the employment of centrifugal force in casting steel articles, and consists in causing the chills to rotate at a high velocity during the time the molten metal is running in.

CADIAT, J. N. V. *The application of centrifugal force in purifying minerals, or any other similar hard substances, by washing.* Dated Feb. 7, 1857. (No. 354.)

This consists in applying the combined action of agitation and centrifugal force to a suitable washing apparatus.

SKERTCHLY, J. *Improvements in, and in the manufacture of saggars.* Dated Feb. 7, 1857. (No. 355.)

It is desirable that saggars should receive in their manufacture a much higher heat than they are ever subjected to afterwards in their general use, (for plastic materials undergo but trifling change in their condition at any lower degree of heat than that which they have already sustained,) and it is in certain methods of imparting this higher heat that the invention consists.

GREENSLADE, W., and J. WOOD. *Certain improvements in brushes, especially applicable to painters' brushes.* Dated Feb. 7, 1857. (No. 356.)

This consists in cutting in the handle of the brush, near the brush part thereof, saw cuts, or openings, and in introducing into them plates of metal which pass into the brush part, having wire, string, or other binding, into which brush part they are firmly wedged.

BAUWENS, F. L. *An improved mode of treating and distilling fatty matters, and in the apparatus employed therein.* Dated Feb. 7, 1857. (No. 358.)

This consists in treating and distilling fatty matters in a still, constructed in a peculiar manner, by means of heat conveyed from a furnace through a flue leading under the bottom and around the sides of the still, and by steam introduced into the fatty matters from a series of heated pipes. Also, in forming the bottom of the still concave on the inside and convex on the outside, and with sloping sides; in fitting inside the still a gallery or trough through which the fatty matters descend to the bottom of the still, and whereby they become gradually heated; and in fitting to the still two gauge cocks whereby to regulate the height of the fatty matters in the still. Also, in the construction of a furnace and flues for conveying heat from the furnace under the bottom and round the sides of the still, and for heating the pipes in which the steam is heated.

BROOMAN, R. A. *An improved method of obtaining motive power.* (A communication.) Dated Feb. 7, 1857. (No. 360.)

This consists in vaporising mercury, condensing the vapour, and causing the mercury resulting from such condensation to descend a tube and drive a turbine from which the motive power is taken for any purpose required.

BROOMAN, R. A. *Improvements in measuring the capacity and contents of casks and other similar vessels, and in instruments or apparatus employed therein.* (A communication.) Dated Feb. 7, 1857. (No. 361.)

Claims—1. An instrument for measuring the capacity of casks and other similar vessels, such instrument consisting of a rod or rods furnished with pointed arms which, when out of use, fold into grooves or recesses in the rod, and which, when in use, are spread out from the rod or rods by means of suitable rods or plungers, connecting rods, &c. 2. An improved rod or gauge for measuring the depth of liquid, or the wantage in a cask or other vessel, such instrument consisting of a tube enclosed in a less fragile one, and provided with an internal rod which has a valve or plug attached to its lower end, and a holding piece or knot to its upper end.

WILKENS, W. *An improved cannon, which he calls a revolving battery.* (A communication.) Dated Feb. 7, 1857. (No. 364.)

This consists—1. In a revolving cylindrical plate formed with several chambers for containing cartridges. 2. In means for forming an air-tight fitting between the barrel of the cannon and the revolving cylindrical plate while firing.

PARSONS, P. M. *Improvements in the permanent way of railways.* Dated Feb. 7, 1857 (No. 365.)

This invention was described and illustrated at page 488 of No. 1763.

MURDOCH, J. *An improvement in the process of treating the threads of floss silk, which is also applicable to the threads of other fibrous materials.* (A communication.) Dated Feb 9, 1857. (No. 366.)

The object is to impart to single threads, produced by carding and spinning, and especially to threads of spun floss silk, the appearance of threads of raw silk, without down, and without twisting or surging, by

replacing factitiously the gummy portions of the cocoons of silk, and also the crossings of the spinning or reeling of the cocoons, by a rubbing or friction which produces smoothness of threads, to which result the swiftness of the reel upon which the thread is wound at the close of the operation contributes.

CARTWRIGHT, H. *Improvements in the application and mode of working eccentrics on steam engines.* Dated Feb. 9, 1857. (No. 368.)

These are chiefly applicable to engines which require to reverse their motion, and work in either direction, and consist in arrangements for giving lead to the valves or cocks which supply the cylinders with steam.

TURNER, C., and L. WATERMANN. *Improvements in or applicable to the class of hats made from straw, grass, palm-leaf, or other like materials.* Dated Feb. 9, 1857. (No. 369.)

This consists in shaping and finishing hats made from such materials by steaming and blocking them, as ordinary felt hats are now finished and shaped, and in the application of a stiff edging to the brims of the hats, formed so as to curl over the brim towards the crown of the hat to give stiffness. The patentees also apply to the underside of the brim and inside of the top and side of the crown a coating of hatters' proofing, to give additional stiffness.

TALABOT, L. *Improvements in the manufacture of iron and steel.* Dated Feb. 9, 1857. (No. 370.)

These consist—1. In admitting currents of air, gas, or vapour into molten iron by means of a moveable pipe which passes down through the crucible, the head of which pipe is made with an enlargement pierced with holes through which the air, gas, or vapour passes, and diverges from the centre to the circumference. 2. In forming the crucible of the shape of an inverted cone, and in lining it with chalk, oxide of iron, or a mixture of the two together, or any substance not containing silica in a large proportion; or it may be formed of iron and used without lining, the exterior being kept cool. 3. In so arranging a number of puddling furnaces that after air, gas, or vapour has been forced through molten iron, a portion of such iron may be run into one of the puddling furnaces, and puddled; when more crude iron is put into the crucible, and air again forced through it, and a portion of such iron run into the next puddling furnace, and the operation is repeated.

WRIGHT, D. F. *Improvements in the mechanical arrangement for raising and forcing of water or other fluid, air, or gases.* Dated Feb. 9, 1857. (No. 372.)

This consists, primarily, in causing the tube, through which the fluid passes, to oscillate, this pipe being double or forked at one end, and each fork being in communication with an elastic chamber. In each chamber there is a valve opening inwards, and communicating with the pipe descending into the fluid to be raised, and in each fork is a valve opening upwards; consequently as the pipe or tube above the collapsible chambers is caused to oscillate, the fluid is drawn up into the chambers, and forced upwards or onwards at each oscillation of the pipe or tube.

HARDING, J. *Improvements in the treatment of metallic ores.* Dated Feb. 9, 1857. (No. 373.)

These consist in subjecting iron-stone, or other metallic ores, to the action of steam, or steam and water, as may be found convenient, whereby the shale, &c., are more readily separated therefrom.

WILLIS, H. *Improvements in organs.* Dated Feb. 9, 1857. (No. 376.)

The object is to increase the mechanical facilities for producing a crescendo and diminuendo upon the organ, by enabling the player to draw or shut off any required number of the stops one after the other in succession by one continuous movement.

WALKER, W.T. *Improvements in apparatus used in gas works for exhausting, forcing, transmitting, and regulating the flow of gas, and cleansing and warming gas apparatus.* Dated Feb. 10, 1857. (No. 377.)

This invention cannot be described without engravings.

STOKES, A. *New or improved machinery to be used in the manufacture of nails, pins, screws, and other similar articles.* Dated Feb. 10, 1857. (No. 378.)

This consists of certain machinery for holding pins, spikes, and other articles, and protecting their points during the operation of forming their heads.

BERNARD, J. *Improvements in the manufacture or production of boots and shoes, or coverings for the feet, and in the machinery or apparatus employed in such manufacture.* Dated Feb. 10, 1857. (No. 379.)

This consists—1. Of a mode of treating the soles of boots and shoes by which the edges are finished, and which is performed by means of pressure applied laterally or vertically. 2. In a mode of fastening the soles of boots or shoes; and the patentee prefers for this purpose to use fastenings so formed as to regulate the depth or penetrating distance which they enter the material. 3. In a mode of paring the soles after they have been united to the boot or shoe, and consists in employing a punch of the necessary shape for that purpose, the

parting being effected by pressure. 4. In a machine for mounting or drawing and folding the uppers upon the last and inner sole by placing a piece of India-rubber between two plates, and compressing or contracting the India-rubber by an eccentric action.

GRAHAM, J., J. SHEPHERD, and T. WHITAKER. *Certain improvements in power looms for weaving.* Dated Feb. 10, 1857. (No. 382.)

This is designed for stopping the loom when the shuttle does not enter the shuttle box, and consists in mechanism by which any of the well-known "stopping motions" in connection with which the ordinary frog upon the framing is employed may be actuated.

CHAMBERS, A., and W. H. CHAMPION. *A mode of working railway breaks.* Dated Feb. 10, 1857. (No. 385.)

This consists in applying to a carriage a longitudinal shaft or rod, capable of being coupled at each end with the corresponding shafts of other carriages. This shaft may be made to revolve at will by the guard or brakesman, and communicate motion by an elastic connection to a lever communicating with a friction pulley, which, by the action of the lever is moved into a position to receive a limited rotary movement by a strap from one of the running axles of the carriage when in motion. The motion thus imparted to the pulley is conveyed by a mechanical arrangement to the brake blocks, which thereby press upon the wheels.

BEDSON, G. *Improvements in coating metal with metal and metallic compounds.* Dated Feb. 10, 1857. (No. 386.)

This relates to tinning or galvanising, and consists in the application of certain substances floating on the bath of molten metal, and through which the articles are passed. The patentee employs salts of tin, of which he prefers the chloride, perchloride, and sulphate.

PARTZ, A. F. W. *An improved method of evaporating fluids, condensing and absorbing vapours, gases, and fumes, arresting and precipitating flocculent, metallic, or other particles, and transferring heat from air or steam to fluids and pulverulent substances.* Dated Feb. 10, 1857. (No. 387.)

This consists in making use of discs of woven wire, perforated plates of metal, fibrous substances, or other material, which are alternately immersed in and withdrawn from a fluid, a film of which adhering to them they successively present to a current of air or steam for evaporation, or to vapours and gases for their condensation or absorption, or for the precipitation of metallic or other particles; or which perforated discs or plates, &c., are permanently immersed in a fluid, and a current of vapours or gases forced through them, whereby the current is broken and diffused, and the vapours or gases are brought intimately into contact with the fluid; or which perforated discs or plates, &c., are alternately immersed in and withdrawn from a fluid or pulverulent mass, for transferring to the latter the heat which they take up from a current of hot air or steam directed upon them.

JOHNSON, T. F., and J. WILLIAMS. *Improvements in screw-gill machinery for preparing wool and other fibrous materials.* Dated Feb. 10, 1857. (No. 388.)

In place of the screw shafts or axes only actuating one set of gill combs as heretofore, each of the four axes or shafts have three or more screws thereon, and which turn therewith in order to actuate three or more sets of gill combs.

WATSON, J. F. *Improvements in the construction of watches.* Dated Feb. 10, 1857. (No. 389.)

The works of a watch are enclosed in a case having a metal back and a glazed front, which constitutes the body of the watch; this body is so constructed in respect to a framed case that it can, when desired, be used as a hunting watch, and at other times as an open face watch, with the face and glass in front.

PILCHER, W. W. *Improvements in straw-shakers of thrashing machines.* Dated Feb. 10, 1857. (No. 391.)

A series of endless bands or cords are used parallel to each other from end to end of the shaker, and are kept distended on a series of pulleys on axes parallel to each other. The pulleys are fixed eccentrically to their axes, and the pulleys on the same axis are arranged in different directions, so as to bring the endless cords successively into action, whilst they are moved continuously from end to end of the shaker.

ROYDS, A., and J. KENYON. *Certain improvements, or a certain improvement in machinery for spinning or doubling, commonly known as throstles.* Dated Feb. 10, 1857. (No. 392.)

This consists in causing the bobbins of throstle frames to revolve on vertical tubes attached to the lifting rail. The spindles pass through the tubes, and are by such tubes restrained from contact with the bobbins, so that any oscillation or vibration attending the motion of the spindles may not tend to vitiate the uniformity of the drag applied to the bobbins.

HOWARD, T. *Improvements in the construction of cranked shafts or axles.* Dated Feb. 10, 1857. (No. 394.)

This consists in the manufacture of cranked shafts in more than one piece, especially when of wrought iron, by making

the throws or cranked parts entire and separately from the shaft part, and afterwards uniting the whole.

HEALD, H. and A. *Improvements in pickers and picker checks employed in weaving.* Dated Feb. 10, 1857. (No. 395.)

The improved picker was described and illustrated at page 151 of No. 1775. The improvements in picker checks consist in constructing them in metal, and in arresting the picker at the end of each stroke or throw gradually, and in such manner that the check shall not act as a spring, and that it shall not cause the picker to fly from it.

PITMAN, J. T. *Improvements in the mode of making metallic hames for horses.* (A communication.) Dated Feb. 11, 1857. (No. 397.)

This cannot be described without engravings.

PITMAN, J. T. *An improved system of working metallic ores and their products, both metallic and mineral.* (A communication.) Dated Feb. 11, 1857. (No. 398.)

This cannot be described without engravings.

TODD, W. and J. *Certain improvements in power looms for weaving.* Dated Feb. 11, 1857. (No. 400.)

This relates—1. To a mode of actuating the picking rod, and consists in mechanism so contrived that, as the shuttle enters the box, it presses back the ordinary swell to which is connected a spring in communication with a sliding rod or projecting finger, &c. 2. To a method of working the ordinary weft work stopping motion, which consists in placing it in connection with the aforesaid apparatus, and working the weft hammer by rods in connection with the swell and stud on the crank arm. 3. In combining the crank arm with the stay by two centres or joints, instead of one, and employing a connecting lever between the two. 4. In the application of a lever to the back of each shuttle box, having an incline formed on the picker, and to the back of which is secured one end of the ordinary swell spring, so that, as the picker strikes the incline, extra pressure will be exerted upon the swell, and consequently a gradual break upon the shuttle. 5. In regulating the tension of the yarn or warp by passing a band or cord around the warp beam, one end of which is secured to the framing by an intermediate spring, and the other to the short end of a lever in connection with the ordinary vibrating motion. For regulating the tension of the yarn upon the long end of this lever beyond the fulcrum a sliding weight is employed.

KAY, R. D. *An improved method of using or applying a certain colouring matter, either singly or in combination with other colouring matters, to woven or felted fabrics, yarns, or threads, either in the white or dyed state.* (A communication.) Dated Feb. 11, 1857. (No. 402.)

Claims—1. The method of fixing on woven or felted fabrics, yarns, or threads, the murexide combined with a metallic basis by means of an alkali or salts of alkaline metals, without deteriorating the colour. 2. Fixing murexide or other purpurates by steam, and by the said means its application to printing with other steam colours as described.

POOLE, J. *Improvements in safety or other valves, and in mechanical appliances thereto.* Dated Feb. 11, 1857. (No. 403.)

The patentee so constructs a safety valve that, while having the smallest amount of surface contact with the face or seat, it shall also, by means of certain appliances, have its motion (when acted upon by the steam) in a vertical path upwards and downwards, and hence, he says, avoid that defect of construction which in all other valves causes them, from the action of the lateral force, to jam or stick in their seats, indicating a much less vertical pressure than is in reality acting against their under surfaces, and proving the source of most dangerous explosions.

MACINTOSH, J. *Improvements in the manufacture and discharge of projectiles.* Dated Feb. 11, 1857. (No. 404.)

The patentee takes gunpowder and mixes it with India rubber in a state of solution by the agency of naphtha, or other solvent, or other waterproofing solutions or cements. He then spreads the mixture over cloth or other fabrics, and where the object is to increase their combustion, they are previously saturated with nitrate or chlorate of potash. He cuts shreds from the above material, and forms the same into balls with which he fills shells, the result being that when the shell bursts, the balls contained therein become ignited and scattered in all directions, setting fire to all combustible materials.

POTTS, G. C. *Improvements in cleansing casks.* Dated Feb. 11, 1857. (No. 406.)

The cask to be cleaned is fixed in an inclined position in a suitable frame, mounted on a horizontal axis, supported by bearings on which it is caused to rotate, the cleansing materials having been first introduced at the bung hole which is then closed.

HORTON, J., jun. *New or improved machinery for regulating the generation and pressure of steam in steam boilers, and for preventing the explosion of steam boilers.* Dated Feb. 12, 1857. (No. 407.)

The patentee adapts to the top of the

boiler a casting containing a small valve; the valve carries weight to the intended pressure of the steam, and allows any excess of steam to pass through a pipe. This pipe communicates with a cylinder fitted with a piston, and the rod of the piston carries a rack which engages in a pinion connected with the damper. He also fixes a lever inside the boiler, the short arm being under the valve; the long arm is supported by a float. When the water falls below its level, the weight on the valve is lifted, and the steam passes into the cylinder and closes the damper.

DESVIGNES, P. H. *Improvements in machinery for preparing flax, hemp, and other fibrous materials.* Dated Feb. 12, 1857. (No. 410.)

The flax, hemp, or other material is passed between pressing rollers, then between grooved rollers, and then between two rubbing surfaces formed with numerous small knobs or undulations, and moved to and fro in opposite directions. The material is then subjected to a beating process by certain mechanical instruments.

BAKER, D. *Improvements in the manufacture of compounds of alumina and of magnesia.* Dated Feb. 12, 1857. (No. 411.)

In making a compound of sulphate of alumina and clay, the liquors obtained from alum rock or other aluminous shales by the application of sulphuric acid to the burnt shales (or by adding water in the usual way) are used. Such liquors are evaporated to a certain gravity, when clay is added (by preference China or Dorset clay), and the mass is allowed to solidify.

BLACKBURN, I. and R. *Improvements in engines or implements to be employed in agriculture, applicable also to the transporting of heavy bodies, to the traction of carriages, and to the conveyance of passengers.* Dated Feb. 12, 1857. (No. 414.)

This invention will be described in an early number.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

NEWTON, T. *Improvements in the construction of stockmen's saddles and appendages thereto.* (Partly a communication.) Dated Feb. 6, 1857. (No. 344.)

The object is to render the saddles used by stockmen and foraging parties convenient for transport. The inventor makes the panels removable, and attaches them to the saddle-tree by iron pointed pegs and sockets with an elastic spring in the panel at the gullet. The flaps also he makes removable, and fixes them by means of wedges.

DÈCLE, A., and F. A. DRAULT. *Improvements in the manufacture of bracelets.* Dated Feb. 6, 1857. (No. 345.)

This consists—1. Of improvements in chain or metallic fabrics for bracelets. 2. In the use of these metallic fabrics for bracelets. 3. In tools used for this manufacture. 4. In a new application of a buckle as a fastening.

HEALD, H., and A. *Improvements in looms and in pickers used for weaving.* Dated Feb. 7, 1857. (No. 347.)

This consists in the application of an iron picker check for gradually stopping the picker, to prevent the recoil of the shuttle. And in the construction of an iron picker.

LIMBERT, J. A. *Improvements in marine steam engines.* Dated Feb. 7, 1857. (No. 349.)

This relates to a novel combination of parts of marine engines, which cannot be fully described without engravings.

HADDAN, J. C. *Improvements in marine steam engines.* (A communication.) Dated Feb. 7, 1857. (No. 350.)

This consists in a mode of cooling water after it has been used for condensing steam to enable the same to be used over again, and also to assist in feeding the boiler. The inventor proposes to pass the warm water through a pipe below the water, or in chambers open to the water in which the vessel floats.

WRIGLEY, F. *An improved apparatus for cutting tobacco.* Dated Feb. 7, 1857. (No. 352.)

This consists of a knife having a handle at one end, the other being keyed to a horizontal rod at right angles to it, and having bearings upon the bed of the machine. The action of raising the knife causes a "click" to take up a tooth of a ratchet wheel, which turns a "worm wheel," and advances a rack, which forces forward the tobacco; then the knife being depressed, cuts the projecting piece off.

TAYLOR, J., and E. OWEN. *Improvements in the manufacture of yellow prussiate of potass.* Dated Feb. 7, 1857. (No. 357.)

This consists in the application of brewers' waste hops for affording nitrogen as a source of cyanogen in the manufacture of yellow prussiate of potass, these hops being substituted for the animal matter commonly used.

BROWN, T., and G. PARRY. *Improvements in the manufacture of iron.* Dated Feb. 7, 1857. (No. 357.)

In this invention air is blown down with considerable force upon the top of the melted metal. The blast may be either hot or cold.

BOUSFIELD, G. T. *Improvements in lamps adapted for burning resin oil.* (A communication.) Dated Feb. 7, 1857. (No. 362.)

The difficulty in the use of this oil is the depositing of tar, &c., in the wick. To remove this deposit a tube is used, which surrounds the exterior tube of the burner and projects a short distance above it. The tar, &c., descend between the two tubes, and are discharged into the dripping cup.

HIRST, W. *Improvements in manufacturing felted fabrics.* Dated Feb. 7, 1857. (No. 363.)

A suitable accumulation of sliver having been produced, it is spread on a stout wrapper of open or gauze weaving, and of greater width and length than the sliver. The sliver and wrapper are wound tightly on a roller revolving partly in a trough containing hot water. A bar parallel with the axis of the roller is caused to move from and towards the axis of the roller, by which, as the roller revolves, the sliver will be subjected to and released from pressure alternately. The sliver and wrapper are then unwound, and conducted between pressing rollers. Free steam is applied to the sliver intermediate of the two sets of rollers, and the sliver and wrapper are moved between these rollers till the desired hardness is obtained. The hardened sliver is then fulled and completed as usual.

TAYLOR, J. *Improvements in machinery for crushing various substances.* Dated Feb. 9, 1857. (No. 367.)

This consists in the application of a roller having a serrated surface and being adjustable, to crush substances between the surface of the said roller and a concave surface roughened in a similar manner.

FENN, J. *An improvement in oil-cans and other like vessels.* (A communication.) Dated Jan. 9, 1857. (No. 371.)

This invention was described and illustrated at page 183 of No. 1750.

TAYLOR, T. J. *An improved construction of stereoscope.* Dated Feb. 9, 1857. (No. 374.)

This relates to the application to stereoscopes of a reflecting surface, which will receive the light and transmit it to the surface of the double picture.

GROVES, S. *Improvements in organs.* Dated Feb. 9, 1857. (No. 375.)

This relates to the application to the pneumatic lever of a vacuum chamber, into which air from the air chamber of the pneumatic lever is allowed to escape, or is drawn by the action of an exhausting apparatus connected with the vacuum chamber. A double action will thus be given to the bellows of the pneumatic lever, to cause them to act both ways, and a second bellows can be dispensed with.

HERTS, D. B. *Improvements in apparatus for stamping and embossing.* (A communication.) Dated Feb. 10, 1857. (No. 380.)

This consists of a stand fitted with two beds, the one answering as a dabber when colouring matter is to be used, and the other serving to carry the requisite force when the apparatus is to be employed for embossing.

OWRID, B. W. *Improved method of connecting and disconnecting pipes or tubes.* Dated Feb. 10, 1857. (No. 381.)

This consists in the employment of a ring or collar, the inner surface of which is conical so as to act as a wedge, and a filling piece for placing between the outer surfaces of the pipes and the inner surface of the ring or collar which is placed around the joint. The ends of the pipes being brought together, and the ring or collar placed around the joint, the conical or wedge-shaped filling or packing is then driven between the ring and the pipes, and a perfect junction is effected.

MORGAN, J. *Certain improvements in the manufacture of steel and iron wire for umbrella and parasol frames.* Dated Feb. 10, 1857. (No. 383.)

This consists—1. In the sectional form of the wire to be used for the ribs and stretchers of umbrellas and parasols; and, 2. In the means of producing the desired form, which may be somewhat like the letter T, and may in some instances be modified.

HODGES, W. R. *Improvements in the manufacture of an elastic material, and of its application to certain purposes.* Dated Feb. 10, 1857. (No. 384.)

The inventor takes two elastic materials and unites them by means of a solution of some waterproof substance, thereby producing an elastic and waterproof material resembling cloth.

BRIDGWOOD, J. *Improvements in connecting pipes to the basins of water-closets and wash-hand basins, and also in the means of stopping the outlets of wash-hand basins.* Dated Feb. 10, 1857. (No. 390.)

To connect a supply pipe to the basin of a water-closet, the china basin is made with a short projecting tube with a screw thread thereon, to receive a screw nut formed of china. The supply pipe is formed with a flanch which is received on the interior of the china screw nut, so that when the screw nut is screwed on to the tube formed with the basin, a soft washer of leather will be pressed closely against the end of the screw tube and against the surface of the flanch. In a similar manner the outlet passages of washhand basins are formed.

BROOMAN, R. A. *An improvement in, or addition to the locks of fire-arms.* (A communication.) Dated Feb. 10, 1857. (No. 393.)

The object is to prevent the locking or the bringing down of the hammer, at plea-

sure. In the lock is inserted a rod with a projection or detent, which rod, by the turning of a button on the outside of the lock plate, is made to play and bring the detent under or over the main spring, as the case may be.

ROPES, H. T., and D. W. THOMAS. *Improvements in the application of filters to cocks, taps, or other valves used to draw off liquids.* (A communication.) Dated Feb. 10, 1857. (No. 396.)

This consists in attaching to or forming on the nose or discharge part of cocks, taps, &c., a receptacle for holding a filtering material, and through which the liquids pass, and which chamber or part thereof it is proposed to screw on to the nose of the valve.

DANDRAUT, A. C. *Preserving organised animal and vegetable matters, especially alimentary substances.* Dated Feb. 11, 1857. (No. 399.)

This consists in plunging the substance to be preserved once, twice, or oftener in a bath of liquid resin.

ARMSTRONG, W. G. *Improvements in ordnance.* Dated Feb. 11, 1857. (No. 401.)

These relate—1. To forming guns with the internal cylinder of wrought iron or gun metal in one piece, surrounded by cylindrical casings of wrought iron or gun metal shrunk upon it. 2. To an arrangement for loading at the breech, by means of a screw applied for pressing a moveable breech piece or stopper against the posterior end of the tube, so as to close the same after the charge has been introduced. The projectile and charge are introduced through a cylindrical hole in the screw corresponding with the bore of the gun. The materials forming the tightening surfaces at the breech are of copper. The vent is contained in the breech piece or stopper.

HENDY, J. S. *Improvements in chimney-tops or cowls.* Dated Feb. 11, 1857. No. 405.)

This relates to revolving chimney tops or cowls, and consists in placing a fan or set of leaves on a horizontal spindle in the upper part of the cowl.

LANGFORD, J., and J. WILDER. *A new or improved signal and alarum.* Dated Feb. 12, 1857. (No. 408.)

This invention is described and illustrated at p. 398 of this number.

ADAMS, W. B. *Improvements in buildings and other structures.* Dated Feb. 12, 1857. (No. 409.)

This relates to windows, and is described at p. 398 of this number.

TURNER, T., and H. BOYENS. *Improvements in apparatus for steering ships and vessels, and in apparatus for communicating or signalling between the deck and engine-room of steam-vessels.* Dated Feb. 12, 1857. (No. 412.)

In constructing steering apparatus the rudder head is fitted with two arms, to each of which a chain is attached. The ends of the chains are fixed to two barrels. The chain of one arm passes under, and the other over its barrel. The two barrels are fixed on the same shaft, and between them a screw wheel is fixed on the shaft. Motion is given to the two barrels by a worm or screw fixed on a shaft at right angles to the axis of the barrels, on which shaft the steering wheel is fixed. A somewhat similar arrangement of apparatus is used for signalling.

WILKINS, W. *Improvements in flushing apparatus.* Dated Feb. 12, 1857. (No. 413.)

This consists in fitting in a certain manner a balanced door or valve between a cistern and the drain or sewer. Or it may be fitted in a sewer.

PROVISIONAL PROTECTIONS.

Dated June 12, 1857.

1648. Jules Clovis Dieulafait. An improved method of manufacturing garments, whereby one garment may be changed in form to that of several others.

Dated June 15, 1857.

1670. William Smith, of Salisbury-street, Adelphi. Improvements in chromotypographical printing presses. A communication from A. E. Rochette, of Paris.

Dated July 11, 1857.

1938. Hippolyte Lamy, of Paris. An engine or apparatus for obtaining motive power by an improved method of applying steam, gas, or heated air.

Dated July 25, 1857.

2032. William Johnson, of Stockport, Lancaster, factory operative. Improvements in looms for weaving.

Dated August 25, 1857.

2243. John Gedge, of Wellington-street South, Strand. Improvements in envelopes for letters and other documents. A communication from F. Thénard, of Paris.

Dated September 7, 1857.

2336. Uriah Scott, of Camden Town, civil engineer. Improvements in boots and shoes, applicable in part to shoes for horses.

Dated September 10, 1857.

2353. Henry Lawford, of Berners-street. An improvement in the manufacture of dining tables expanding and contracting tops, applicable also to other expanding and contracting planes.

2354. John Leslie, of Glasgow, merchant. Improvements in carding or preparing textile materials. A communication from A. Sentis and Sons.

Dated September 11, 1857.

2368. William Porter McCallum, of Birmingham, engineer. Improvements in machinery used for stamping or raising metals.

Dated September 12, 1857.

2379. William Gossage, of Widnes, Lancaster, chemist. Improvements in the manufacture of soda and potash.

Dated September 14, 1857.

2380. Thomas Waterhouse, of Sheffield, gentleman. Certain improvements in machinery or apparatus for applying steam and atmospheric air to actuating and governing forge and other hammers.

Dated September 17, 1857.

2413. Hugh Greaves, of New Palace-yard, Westminster, civil engineer. Improvements in constructing the permanent ways of railways.

Dated September 18, 1857.

2426. David Lichtenstadt, of Castle-street, chemist. Improvements in the manufacture of pulp, of which paper and other fabrics are composed.

Dated September 28, 1857.

2490. Robert Kay, of Castleton Print Works, near Rochdale, calico printer. Certain improvements in machinery or apparatus for printing calico and other textile fabrics.

2492. William Bestwick, of Salford, braid manufacturer. An improved material suitable for skirt springs and other similar purposes.

2494. Richard Quin, of Rodney-street, Pentonville. Improvements in the construction of cases suitable for containing photographic and other pictures.

Dated October 1, 1857.

2519. James Ward, of Church-street, Liverpool, glass and china dealer. Improvements in pumps applicable for mines, ships, and other purposes.

2521. Evan Leigh, of Manchester, mechanical engineer. Certain improvements in machinery or apparatus used in spinning and preparing cotton and other fibrous substances, parts of which are also applicable to machinery or apparatus generally.

2523. James Murdoch Napier, of Vine-street, York-road, Surrey, engineer. Improvements in printing machines.

Dated October 2, 1857.

2525. Luigi De Cristoforis, of Milan, Italy. Regulating the ascent and descent of the railway locomotives on inclined planes, which is to be called the De Cristoforis ascending and descending locomotive apparatus.

2527. Alfred and Henry Illingworth, of Bradford, York, spinners. Improvements in machinery or apparatus for combing wool and other fibrous substances.

2529. John Sweet Willway, of Bristol, gas engineer. An improved apparatus to act as a gas valve.

2531. Peter Kerr, of Paisley, N.B., manufacturer. Improvements in preparing and finishing threads or yarns.

2533. Alexander Macpherson, of Carstairs, N. B., joiner. Improvements in the manufacture of fences.

Dated October 3, 1857.

2535. Robert Green, of Crawshaw Booth, Lancaster, joiner. Improvements in raising or forcing liquids.

2537. William and Thomas Riley, of Greetland, York, dyers. Certain improved means, machinery, or apparatus for "saving" or covering the lists of textile fabrics previous to the dyeing of such fabrics.

2539. George Chowen, of Dippertown, Exeter, gentleman. Improvements in the arrangement and construction of fog, wreck, and other buoys.

2541. William Edward Newton, of Chancery-lane. Certain improvements in machinery for making mould candles. A communication.

2543. John Stobbs and George Roger Hall, of North Shields. Improvements in pumps for raising water and other liquids.

Dated October 5, 1857.

2545. John Rubery, umbrella and parasol manufacturer, of Birmingham. Improvements in the manufacture of certain parts of umbrella and parasol furniture.

2547. William Richardson, of Ranelagh-grove, Pimlico, and George Richardson, of Copenhagen-street West, Islington. Partly or wholly stopping wheels of carriages of every description when in motion, and such break or breaks to be applied by the motive power.

2549. George Davies, of Serle-street, Lincoln's-inn. Improvements in the combustion of coal without smoke, which improvements are also applicable to the combustion of other kinds of fuel. A communication from J. L. Tardieu, engineer, of Limoges, France.

2551. Louis Beckers, of New York, chemist. Improvements in apparatuses for exhibiting daguerreotype, photographic, and other stereoscopic views and pictures. A communication.

2553. John Penford Harvey, of Spalding, Lincoln, miller. Improved machinery for crushing land or clods.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," October* 20, 1857.)

1585. F. Jossa. Improvements in uniting iron and steel.

1588. J. Morris. Certain improvements in connecting the rails of railways, and in supporting the same.

1594. E. H. Hudson. Improvements in means or apparatus to prevent driving straps lapping on the shafting when they shift off their pulleys.

1597. E. Edwards. An improved mode of fastening stair rods and other rods.

1604. J. Bickford. Improvements in machinery for cutting gutters for irrigating land and for cutting other surface drains or gutters.

1609. J. H. Tuck. Improvements in the application of light to facilitate operations under water.

1618. G. Mumby. Improvements in machinery for sewing, embroidering, and other ornamental work.

1626. M. Miller. Improvements in cocks, taps, or valves.

1651. E. Brasier. Improvements in treating flax, hemp, and other vegetable fibres, and in the machinery employed therein.

1652. C. D'Ambly. Improvements in cutting and preparing horn. A communication.

1655. E. Barsanti and F. Matteucci. Improved apparatus for obtaining motive power from gases.

1655. G. Lister. An improvement in carding engines.

1663. E. Cominal. Improvements in printing shawls and other tissues.

1664. T. M. Jones. Improvements in apparatus for cutting and gathering fruit and flowers.

1667. T. Heaton. Improvements in self-acting doors and gateways.

1688. R. Goulding. Improvements in the extraction of gold and silver and other metals.

1692. S. Sturm and H. E. Bour. Improvements in optical lenses, and in machines for manufacturing the same.

1701. G. P. Clark. An improved safety valve for steam boilers.

1711. J. Champion. Improved arrangements of spindles and flyers applicable to machinery or apparatus for preparing, spinning, and doubling fibrous materials.

1716. H. Jaeger. Improvements in looms for weaving. A communication.

1722. W. Wright. Improvements in flushing apparatuses, applicable to cisterns and water closets.

1744. C. D. Seropyan. A mode of preparing bank notes, bills of exchange, and other papers, to prevent counterfeiting by photography and its kindred processes.

1746. W. Knapton. An improved machine for drilling holes in metal and other substances.

1763. H. Genhart. Improvements in fire-arms, in rifling the same, and projectiles employed therewith.

1797. B. Nicholls. Improvements in mules for spinning.

1809. A. A. Olivier. Improvements in treating or preparing and winding silk from the cocoon, and in apparatus for the same.

1835. W. E. Newton. Improved processes for ornamenting metallic surfaces, and for producing surfaces, in intaglio or in relief, for printing purposes. A communication.

1969. J. H. Johnson. Improvements in machinery or apparatus for marking or imprinting characters on paper and other fabrics. A communication.

2034. J. Schönemann. Improvements in the construction of weighing machines. A communication.

2038. W. B. Williamson. Improvements in looms employed for weaving textile fabrics and fibrous materials.

2132. T. G. Shaw. Improvements in washing and wringing machines.

2245. G. W. Hemming. Improvements in apparatus employed in delivering submarine telegraph cables from ships.

2281. J. Gilbert. An improvement in combined thrashing machines.

2308. P. G. Gardiner. New and useful improvements in the conical coiled steel railroad car spring, and also of new and useful machinery for preparing, coiling, and converting steel plates or bars into such springs, and for testing and measuring the strength of such springs.

2318. A. Turner. Improvements in the manufacture of elastic fabrics.

2344. W. Geach. Improvements in machinery for propelling vessels.

2379. W. Gossage. Improvements in the manufacture of soda and potash.

2401. A. R. Le Mire de Normandy and E. T. Simpson. Improvements in the manufacture of soap.

2415. B. Burleigh. Improvements in the mode of laying submarine telegraphs.

2433. A. Rigg, sen., and A. Rigg, jun. Improvements in preparing, sawing, planing, grooving, tongueing, moulding, mortising, and tenoning wood, part of which is applicable to preparing other vegetable substances.

2434. W. Naylor. Improvements in power looms for weaving worsted, cotton, silk, woollen, and other fibrous substances.

2451. D. Forrester. An improved fastening for securing watches, &c., worn on the person, whereby the same are rendered safe from robbery, to be called "Forrester's Patent Watch and Property Protector."

2488. T. Crick and J. T. Crick. Improvements in the manufacture of boots, shoes, and slippers.

2503. J. C. Pearce. Improvements in apparatus used in hot pressing, and in the means of manufacturing parts of such apparatus.

2507. W. E. Newton. Improved apparatus for measuring gas. A communication.

2531. P. Kerr. Improvements in preparing and finishing threads or yarns.

2561. C. W. Finzel and J. Bryant. Improvements in cleansing animal charcoal, and in removing iron and other impurities therefrom.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2196. Anthony Bernhard Baron von Rathen.
2197. John Coope Haddan.
2221. Alfred and Henry Illingworth.
2234. Robert Walter Winfield.
2236. Samuel Mason and William Beeby.
2237. Peter Armand Le Comte de Fontainemoreau.
2238. John Platt.
2239. Thomas Biggart and Allan Loudon.
2261. Charles Cowper.
2311. William Reid.

LIST OF SEALED PATENTS.

Sealed October 16, 1857.

1074. Thomas and Frederick Sugden.
1076. William Weild.
1077. Robert Hindle.
1094. Thomas Harris.
1098. William Henry Dearing Granville.
1107. John Cowdry Martin.
1112. John Underwood.
1211. Frederick Walton.
1212. Frederick Walton.
1216. Thomas Baldwin.
1235. Edward Tucker.
1304. Théodore Lipkau.
1317. Robert Wilson.
1321. John Miller.
1361. William Hyde and Joshua Hyde.
1438. John Wesley Hackworth.
1470. John Crossley.
1512. Alfred Vincent Newton.
1949. William Edward Newton.

Sealed October 20, 1857.

1135. Gerolamo Cavanna.
1138. William Robertson.
1146. George Scarr and James Pollard.
1148. John Garnett.
1152. Albert Demerit Bishop.
1160. William Clark.
1162. Thomas Craddock.
1167. Samuel Sunderland and Richard Dean.
1168. Edmund Winder Otway.
1170. Thomas Mann.
1186. Alfred Eddington.
1214. Lucius Henry Spooner.
1220. Charles Cammell.
1242. Joseph Seelie Greenhow.

1264. Juste Herrere.
1300. William Colborne Cambridge.
1322. John Miller.
1354. Michael Henry.
1522. Peter Armand le Comte de Fontainemoreau.
1934. John Loach, James Jones Salt, and Burton Day.
1966. Edmond Bertin.
2168. Frederick Lipscombe.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

The letters of Mr. Atherton, Mr. Holland Mr. Rock, Mr. Burcham, and some other correspondents, reached us too late for insertion in this Number.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1786.] SATURDAY, OCTOBER 31, 1857. [PRICE 3D.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

WILTON AND HUGGETT'S GAS REGULATORS.

Fig. 2.

Fig. 1.

WILTON AND HUGGETT'S GAS REGULATORS.

Messrs. Wilton and Huggett, of Eastbourne, Sussex, have introduced a very useful apparatus to be applied to a gas burner (or to a series of burners) which, according to the pressure at the gasworks, will admit at a small pressure, say, for instance, the ordinary day pressure of a minimum supply to the burner just sufficient to keep alight, and which, on the full evening or night pressure being applied, admits of the flow of sufficient gas to keep the light at the full extent required. The main object of the invention is to prevent the necessity of turning off and on gas to street lights, and by means of the apparatus, during the hours the lights are not required, a minimum quantity only flows through it. This operation is effected by diminishing the pressure at the works or elsewhere, whereby a valve in the apparatus closes and only admits gas through a very narrow tube or orifice. On the full pressure being applied, the pressure opens a valve, and admits the full supply of gas to pass through it to the burner. Under no circumstances is the gas ever completely extinguished when the apparatus is in action.

In the engravings on the preceding page, fig. 1 is an external elevation; and fig. 2 a section of the apparatus. A is a fixed chamber formed with a trough, *a*, for containing mercury. B is a fixed pipe formed with a cover, and supporting a chamber, *b*, also containing mercury. C is a cover forming, by means of the mercury in the trough, *a*, a closed chamber, free to rise when acted upon by the pressure of the gas. D is a button, supported upon a pin in the mercury trough, *b*. E is a pipe for conveying the gas to the burner, either through an orifice *e*, when the night pressure is off, or through the main body of the pipe when the full pressure is on. This pipe, E, is connected to the lever, C, and is free to rise and fall with it; and the mouth is formed to fit over the button, D, and with this button and the mercury a tight joint is formed. F F are a balance lever and weight to balance the weight of the cover, burner, and tap, and whereby the degree of pressure to produce the required results may be adjusted. G is the burner tap. H, the burner. I is a wire gauze screen held by the bent rod, *f*, preventing the wind putting out the light when the flame is at its minimum. The engravings show the position of the parts where the ordinary day pressure is on, and the dotted lines show their position with the night or full pressure. When the day pressure is on there is no passage for the gas except through the small orifice, *e*, in the pipe, E, and the burner is fully protected by the wire gauze screen; but when the full pressure is on, then the cover rises, and with it the pipe, E, allowing free passage through it, while the burner, being raised to the level of the screen, no light is intercepted by it.

The apparatus may be used simply for extinguishing gaslights by closing the orifice, *e*, and then on the pressure being taken off, the gas would be entirely shut off from the burner by the mouth of the pipe, E, being closed.

ON SUBMARINE TELEGRAPH CABLES.

BY J. BODIE, R.N., MASTER OF H.M.S. "AGAMEMNON."

(*Concluded from page 389.*)

From experiments I have made, as well as calculations of the decrease of specific gravity by the combined descent of a lead and line, it may be inferred that bodies heavier than water descend at an uniform rate through all depths of the ocean. The following table was formed from the soundings obtained in the Mediterranean last year, and is calculated at seine twine, (the sounding line,) being 240 fathoms to the pound; and as every fathom the sounding lead descends alters the specific gravity of the combined materials, a very fair estimate of the rate of descent for each gravity may be formed.

From the table on page 411 it will appear, that the rate of descent is as the amount of specific gravity; and as in the table the quantity of friction is not taken into account, we may safely infer that the gravities, if left to themselves, would descend even more quickly than there observed, particularly the lighter ones. From this table a more simple one may be readily formed as follows, which will show at a glance at what rate any cable of known gravity would sink.

Specific Gravities.	Minutes of Time required to descend, 100 fms.	2000fms.	REMARKS.
	m.	m. s.	
5·5	2·2	44 0	
5·5	2·4	48 0	
4·	2·9	58 0	
4·	3·4	68 0	Shore end At. Cab. 4218.
3·5	3·8	76 0	
3·	4·4	88 0	Ocean part Atlantic Cable, 2952.
2·5	5·0	100 0	
2·	6·5	130 0	
1·5	9·1	182 0	Proposed Hemp-c. Cable, 1319.
1234	10·0	200 0	Common Rope.

Table showing at what rate substances of various Specific Gravities descend in the Ocean. Deduced from Deep-Sea Soundings. By James Bodie.

Specific Gravities.	Number of Fathoms below the surface.	Time Specific Gravity takes to sink 100 fathoms.	Time occupied in descending the fathoms in 2nd column.	REMARKS.
		m. s.	m. s.	
5885	277	2 23	6 36	Mediterranean soundings, seine twine, 240 fathoms to the lb.
5636	277	2 36	7 12	
5533	277	2 6	5 49	
4877	277	2 17	6 14	
4848	517	3 23	17 29	
4609	277	2 48	7 45	
4594	277	3 5	8 32	Spec. grav. of shore end Atlantic Cable, 4218.
4192	517	3 35	18 31	
3808	795	3 24	27 2	
3762	795	3 46	29 56	
3505	795	3 40	29 9	
3494	1012	3 35	36 13	
3469	795	4 2	34 35	
3313	795	4 9	33 00	
3134	1310	3 58	51 57	Spec. grav. of Limestone, 3136.
3095	795	4 40	37 5	
3064	1012	4 17	43 21	
3032	1012	4 13	42 40	Spec. grav. of Atlantic Ocean Cable, 2952, diam. ⅝ inch.
2920	1012	5 9	52 6	
2912	1012	4 34	46 12	
2900	1530	3 43	56 52	Spec. grav. of Parian Marble, 2838.
2818	1012	4 5	41 59	
2817	1530	5 24	81 36	
2706	1807	4 22	78 54	
2523	1965	6 7	120 0	
2554	1310	5 10	67 20	Spec. grav. of Ocean Cable covered with 3-yarn spun yarn, 2280, diameter ⅞ inch.
2287	1965	5 44	112 38	
2221	1965	6 17	123 20	
2286	1500	6 42	70 40	
2447	2000	6 2	120 40	
2145	2000	6 17	125 40	Spec. grav. of Grindstone, 2143.
2056	2000	6 58	139 20	
2397	2000	3 40	73 20	Amer. sdngs, wx. twine, 90 fms. to lb.
2201	2500	4 1	100 25	,, ,, ,, ,,
2073	3000	4 30	135 0	,, ,, ,, ,,
1500		8 48		Specific gravity of sea sand, 1528.
1319		9 36		,, ,, of hemp-covd.cable,silk
1234		10 00		,, ,, of com.tard.rope.[1300.

By this table it will be seen, that the cable whose specific gravity is 2,952, will take one hour and thirty minutes to descend 2,000 fathoms; and the cable whose specific gravity is 1,500, will take three hours and two minutes to descend to the same depth; thus making one hour and thirty minutes' difference in the descent, and nearly 50 per cent. difference in the gravities—ensuring in the one case an easy and gradual rate of sinking, whilst in the other case, its great weight causes it to make a rush that there is hardly any possibility of controlling. Again, the hemp-covered cable could be paid out simply like any other rope, the machinery being merely a four-feet diameter cylinder, controlled by common crane brakes, and divided by brass rods to keep the turns from riding; ensuring, without any other contrivance, simple and complete control, with quite enough power to break any strength of cable that need be immersed in the sea.

From the foregoing remarks it would appear that in all future operations of laying deep-sea telegraphic cables, they should be, with respect to specific gravity, in an inverse ratio to the depth of the sea on the intended route; that is, the shoaler the water the heavier the cable, and *vice versâ*,

the lightest gravity of the cable being about 20 per cent. more than the material composing the bottom, which is brought up by the sounding lead from the greatest depth.

The shore ends of such a cable should extend into forty-five or fifty fathoms water; then cable of 2,952 to about 250 fathoms, that being the greatest depth which I think the surface agitation caused by gales could affect the bed of the sea. From that depth until a corresponding depth is reached on the opposite side, the lightest cable should be used, and the speed of the paying-out ship be as great as its issue from the hold would allow. By these means, and careful coiling, no possible foul could occur; and the friction of the inboard part of the cable, combined with its weight coming up the hatchway would, from its easy and light deposit in the sea, hardly require the least strain on the brakes of the cylinder; but if in paying overboard the heavier portion, or shore end, one cylinder would be insufficient to hold the cable, another might be applied before it.

These cylinders should be placed close aft, so that time should be given to clear any impediment to their revolutions that might be brought up on the cable from below; and the attendant at the brake should face forward, to see that the cable came up clear from the tier, a bell-handle being within his reach to signal, "reverse the ship's engine instantly."

If in the next attempt the present Atlantic telegraphic cable were served with three-yarn spun yarn, it would decrease its specific gravity to 2,280, and increase its chances of success fifty per cent., although its diameter would be increased from five-eighths to seven-eighths of an inch.

Submarine Tunnel between England and France.—The *Siècle* states that the possibility of uniting England and France by means of a submarine tunnel has been "practically and scientifically" considered by a skilful engineer, M. A. Thomé de Gamond. This gentleman has submitted his project in the first place to the Emperor, who was greatly struck with it. Afterwards the Minister of Public Works, in accord with the Minister of Marine, named a special commission, composed of the most eminent scientific notabilities. This commission has decided that M. Thomé de Gamond was no mere dreamer. The English government have also named on their side a commission, and "it is probable that in the coming spring French and English engineers will apply themselves to the work of vigorously examining the practicability of the project."

THE IRON TRADE.

(From our own Correspondent in Staffordshire.)

The Influence of the American Crisis and the Price of Money on the Iron Trade—Quarterly Meetings and Prices—Prosperity of the Trade shown in the Board of Trade Returns, in Mining Statistics, and in Private Statistics—Decline in Prices—Attempts to stop the Decline—Reduction of Wages in North Wales—The Indian Affairs.

The most prominent fact in the history of the Iron Trade in the past month is the American Crisis, accompanied as it has been by the tightness of the money market at home, with the consequent restriction of operations.

Whilst, however, there are some iron-making firms who are largely interested in the American difficulties, the larger number certainly are not; and they have therefore been affected by it only relatively, namely, through the money market. To the surprise of some people, whose transactions with the United States are large, most of the works are now fully occupied, but they are so only upon small orders, and their confidence is not strong that they will occupy the same favourable position this time next month.

The quarterly meetings which have been held since our last notice, determined to uphold in the succeeding current quarter the prices that have prevailed for some time past. But the transactions that have been entered into since that time by firms that are supposed to be staunch upholders of the "trade" compact have shown that the decisions of those meetings are fast becoming a dead letter; for it is a fact that some such houses have tendered for orders at prices below those of firms who are not numbered among the members of the "trade," and are usually termed "undersellers."

The returns both of the Board of Trade, the Mining Record Office, and the statistics obtained by private persons of the South Staffordshire trade, all demonstrate that the iron trade is growing rapidly.

The last returns of the Board of Trade demonstrate how injuriously the Indian affairs are working upon our commerce and manufactures, namely, in reducing the increase of our exports, as compared with 1845, one-half. Yet the total declared value of our exports in August, 1857, were £11,638,805, whilst in August, 1856, they were £10,753,292. The following is the value of the iron in its different descriptions, exported in the month of August, in the respective years of 1856 and 1857:

	1856.	1857.
Pig iron	136,409	140,614
Bar and rod iron .	589,381	566,966
Iron wire........	17,850	27,828
Cast iron........	52,920	61,516
Wrought iron....	358,760	358,044

From out of the 200 folio pages of Mr. Robert Hunt's last report, from the Mining Record Office, we gather that the iron manufacture has made extraordinary progress during the last few years. The returns show that last year 10,483,309 tons of iron ore were raised, and 3,636,377 tons of pig iron were produced from the following number of blast furnaces:—England, 324; Scotland, 127; Wales, 171; total, 622. The mean average price of the ore was 11*s.* per ton, this giving £5,695,815 as the value of the iron ore produced in Great Britain during the year. The total produce of pig iron at £4 per ton gives a money value of £14,545,508. Recently some gentlemen interested in the South Staffordshire iron trade have been at some pains to obtain as correct a list as they could of the number and the extent of the operations of the several pig and malleable iron firms in that part of the kingdom. Before this the latest reliable information upon these matters dated as far back as December, 1852. At that time there were 124 blast furnaces in operation, producing on an average 12,700 tons of pig iron weekly; the number of puddling furnaces at work was 1,462, consuming weekly in round numbers 16,000 tons of pig iron. From the account now published it appears that there are now 60 firms in South Staffordshire, three of whom did not exist in 1852. There were 155 furnaces in blast in September, 1857, against 126 in December, 1852, and 25 out of blast, against 32 five years since.

From these figures it is apparent that there were at the time of the publication of the figures 28 more furnaces in blast than there were in 1852, an increase of nearly 25 per cent. An average weekly yield of 3,000 tons of pig iron was shown to be thus obtained. Large as this increase is—some 150,000 tons a year—it would seem to fall short of the consumption; for the 82 and 83 malleable iron-makers of South Staffordshire now have between them 2,024 puddling furnaces, which is an increase of between 500 and 600 upon the number of 1852. Regarding the foregoing figures as correct, the relative account of produce and consumption would probably stand as follows:

	Tons.
Produce of 155 blast furnaces, each 110 tons per week	17,050
Imported from Shropshire, Derbyshire, Potteries, North Wales, Forest of Dean, &c..	2,500
Total................	19,550

The consumption at the present time we estimate as follows, allowing 10 per cent. of puddling furnaces under repair or standing: 1,800 puddling furnaces, at 11 tons each, 19,800.

The above figures, whilst they are not quite correct, are a pretty near approximation to the truth. The number of furnaces in blast have certainly been diminished since that time, as will appear. An expansive capability still marks the trade; for in every direction where there is a probability of the making of iron being pursued with success, there capital is readily and profitably invested.

The decline in prices is only of a temporary duration; and it is thought, so soon as the Americans can right themselves, there will be a much larger demand for iron from the United States market than has existed for some time past. Competing with Britain at present prices is hard work for the American manufacturers, and an attempt to overcome it is said to have caused the overthrow of some of the leading iron making firms there.

Neither in malleable iron nor the pig iron are prices so good as they were at the time of our last. Pig iron is 2*s.* 6*d.* a ton cheaper; but, with a view of preventing a further decline, an arrangement has just been come to by some of the proprietors to blow out each a furnace to the number, it is said, of a dozen.

The Indian difficulties have had the most effect upon North Wales, who are makers to so large an extent of rails. The news reaches us as we write, that as a consequence wages are being reduced in that district. Such a course is not, however, at present contemplated at the English works.

Among the iron masters generally, the step taken by the Bank Directors in raising the rate of discount is regarded with favour, as tending to put an earlier period to existing uncertainties.

The Electric Light.—The *Mining Journal* states that electric lights, produced by apparatus improved by Professor Way, will be employed through the night during the launch of the *Great Eastern*, which will occupy, at least, a day or two. It is not yet (we write on Thursday) decided whether the launch will occur on the 3rd November or the 2nd December, but we think the latter will be the day.

"Big Ben."—Our readers will learn with regret that this great and costly bell has been cracked, and is now utterly useless for the Palace of Westminster. It is supposed to have been broken by using too great a hammer before the bell was properly hung.

TONNAGE AND SHIPPING REGISTRATION.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Referring to your editorial article on "Tonnage and Steam Ship Registration," in the *Mechanics' Magazine*, No. 1781, I have to observe that its tendency is obviously to lead your readers away from the facts of the case by advancing perversions of my statements to the effect that I am seeking to impose dogmatic rules on the practice of naval architecture and vexatious legislative restrictions on the commercial management of shipping. In taking this course, you are imposing on your readers by attributing to me statements which I have not expressed, and motives which I disavow. This has been your subterfuge throughout this discussion; and now, in reply to my late letter challenging this procedure, which, in No. 1782, you acknowledge to have received, but which letter you decline to publish, you coolly remark:

"Mr. Atherton mistakes the position which we occupy as Editors of the *Mechanics' Magazine*, if he imagines that we are not to use our own judgment with regard to the matter which we think it important to submit to our readers."

And further,

"Should Mr. Atherton think it worth his while, after this announcement, to reply to our strictures, we do not pledge ourselves either to insert or to reject his reply. We shall certainly, however, exercise our editorial prerogative of judging if any part, or how much of it, is likely to interest our readers, or is worthy of their attention."

The "prerogative" of an Editor is usually presumed to be exercised in accordance with truth; but for an Editor to assume the position of advocate to a party, publish perversions of his opponent's case, and then claim the editorial prerogative of suppressing or garbling the reply is monstrous. Nevertheless, I do think it worth my while to reply, conceiving it will promote the cause of Shipping Registration Amendment, that the weakness which attends your editorial attempts to uphold the present system be made apparent; and this weakness will be manifested by your editorial gagging of the *Mechanics' Magazine* press almost as completely as by your continuance of the evasive burlesque by which, in No. 1781, you have attempted to obscure the vision of your readers in respect to the part that I have taken in the tonnage question.

The object to which, as yet, my efforts have been directed has been to establish the case that the Merchant Shipping Act of "1854," and the tonnage registration based thereon, do not fulfil the requirements of public interests. This now admitted deficiency of our registration system has been brought before the notice of the British Association at Dublin by the Report of the late Tonnage Committee in the following terms:

"Your Committee having duly weighed the character of the evidence and the opinions given therein, are of opinion: 1st, That the present method of measuring and registering the tonnage of shipping gives a very close approximation to the internal capacity of a ship, but that it *gives no measure of the power of a ship to carry weight.*" 2nd, Engine power (H. P.) though an item of registration, yet has *no practically definite or legalised signification*, as a measure of marine engine capability for working power."

These two resolutions of the late Tonnage Committee, which are embodied in their report presented to the British Association at Dublin, you do not present to your readers. Nevertheless, these resolutions as to the fact of the deficiencies of the existing registration combined with the additional papers presented to the Association by Admiral Moorsom and myself, dissipate the mysterious halo of unworthy influences which you attribute to the British Association in having again appointed a Committee to prosecute the subject of shipping registration amendment.

Further, you are pleased to express your indignation "that Mr. Atherton's paper read at the Cheltenham meeting, in consequence of which the Tonnage Committee was appointed, has been printed among the reports officially made to the British Association; thereby stamping it with an authority to which none but the most valuable scientific papers are entitled;" and you question the means by which such recognition of my paper was obtained. I can only explain that, by a resolution extant on the minutes of the *mechanical* section before whom my paper was read at Cheltenham, it was unanimously resolved that this paper should be recommended for the distinction of being printed in the volume of Transactions of the British Association for the year 1856, which recommendation has been carried into effect. The notice thus taken of my papers by the British Association is only in keeping with the proceedings of the Society for the encouragement of Arts, Manufactures, and Commerce, who awarded their silver medal to my paper, in exposition of tonnage anomalies read before the Society of Arts, in May, 1855.

Under the circumstances of approbation of my efforts thus expressed by the British Association at its consecutive meetings at Cheltenham and Dublin, and by the Society of Arts, London, it becomes a curious sub-

ject of inquiry to trace out the device by which the Editor of the *Mechanics' Magazine* is thus attempting to impose on his readers the preposterous imputation that the Committees of the British Association have permitted themselves to be unworthily tampered with in the discharge of the duties assigned to them. Now, so far as relates to myself and to my papers on tonnage, I characterize the editorial article on tonnage in the *Mechanics' Magazine*, No. 1781, as a perversion of my expressed statements; for example: by my report to the Tonnage Committee which is embodied in the report presented to the British Association of Dublin, I refer to the *Times* advertisements in relation to the packet ships *Lightning*, *Ganymede*, *Alma*, *Sardinian*, *Anglo-Saxon*, and *Ava*, as evidence of the various significations applied to the word "ton" by which ships are advertised, showing that tonnage is sometimes quoted without expressly saying whether "tons register," or "tons burden" is meant, though the tons burden of a ship is sometimes treble, and frequently double the register tonnage; so that a ship advertised as "2,000 tons" may turn out to be a ship of only 1,000 tons register, or, it may be of 4,000 tons burden, according as the *tacit* denomination of the advertised tonnage (tons) may, in reality, be "tons burden," or "tons register." In the case of steamers, the matter is still worse; for, in addition to the three terms for tonnage above named, we have "gross register tonnage," neither one of these terms expressing the tons weight of cargo that a ship will carry. Thus, our tonnage system is analogous to the thimble rig, but worse in degree: for, the thimble rig is worked with three chances of delusion, but the tonnage rig involves four. This analysis of shipping advertisements, as published daily in the *Times*, was the origin of my paper presented to the Statistical Section at Dublin, entitled "Suggestions for Statistical Inquiry into the extent to which Mercantile Steam Transport Economy is affected by the constructive type of Shipping;" in which paper, rather than refer to existing ships, the private property of individuals, I assumed a progressive series of proportions, in which the length varied from four times to ten times the breadth, and the load draught varied from one-third to two-thirds of the beam (these extremes being within the limits of ship-building practice); and assuming all these ships to have the same elements of construction as respects weight of build and lines, I was enabled to show the character of the anomalies suggested by my paper as the subject for statistical inquiry; but, observe now, the course adopted in your review. The review ignores the specified public advertisements of the *Lightning*, *Ganymede*, *Alma*, *Sardinian*, *Anglo-Saxon* and *Ava*, which I added in proof of the tonnage rig, and proclaims that the whole investigation is a "figment of Mr. Atherton's teeming brain."

Similarly, on the question of statistical "freeboard," the views of the late committee, in which I concurred, are expressed in the following extract from a letter forwarded by the Tonnage Committee. (See report of the late Tonnage Committee, Appendix No. 19), to Professor Phillips, secretary to the General Committee of the British Association:

"The desire of this Committee is to obtain data *based on practical experience*, such as it is presumed may be supplied from the records of the Admiralty, without in any respect compromising the public service, showing the elements of a selected number of vessels of those classes which are commercially used for the conveyance of mails, passengers, and cargo, bearing on the question of displacement at various draughts, as indicated by the scale of displacements, understood to be recorded by the Admiralty for all vessels in the public service; showing also the launching draughts, the light draughts, when equipped ready for service, but without armament or sea stores, and the deep draughts, when fully stored and laden, at which such vessels *have been sent to sea* in H. M. S."

"The object for which these data are required by this Committee is to ascertain the analogy which subsists in vessels of various proportions of build between the displacement at the deep draught and the total external cubature measuring up to the deck."

The data of actual *sea service* freeboard thus sought for by the Tonnage Committee could not be obtained; and in the absence of the matter of fact data thus sought for, the Committee was foiled in its attempts to mature and propose any definite remedy for the admitted deficiencies of the present registration system. Hence the decision of the Committee "to confine the report to those points on which a definite and almost unanimous opinion could be given." You taunt me with being in a minority of the late Tonnage Committee on the subject of freeboard, on which the Committee never came to a division; but taking your own view of the recorded opinions of the Committee, I do not perceive why Admiral Moorsom, Captain Andrew Henderson, and Mr. Charles Atherton should be regarded as a minority in comparison with the Rev. Dr. Woolley, Mr. Scott Russell, and Mr. James R. Napier.

The part taken by myself individually on this question of freeboard is set forth by the

following extracts from my report to the Tonnage Committee:

"With reference to the assignment of some limit to the load draught of water of ships, all constructors of shipping on scientific principles assign a deep-draught water-line or constructor's load-line, with reference to which they determined the calculations of all the principal elements of the ship in regard to her carrying capabilities. Since, then, the load water-line, or rather the deep draught flotation, constitutes an essential element of scientific naval architecture, it cannot be said the science of naval architecture would be interfered with by the constructor's deep draught of water forward and aft (or some line to be officially assigned as the load-limit), being made an item in the official registration of every ship, and duly marked on the ship itself. It is presumed that the protection of life and property from shipwreck at sea, which would result from an authorized inspection and *record* of the draught at which ships *actually put to sea* is as legitimate an object of legislative care as is the protection of life and property from the ravages of fire by the official supervision of party walls instituted by building acts. In the case, however, of the builder of the ship, from any cause, assigning a deep draught limit, such as nautical science may not justify, it may be necessary to determine some rule whereby we may specifically assign the position of the statute nail or gauge mark *to which the record of draught at which ships put to sea may have reference.* The assignment of this statute gauge-mark is a question of naval architectural science, on which, as an engineer, I do not put forward my opinions as having claims to authority."

Again:

"It is submitted that an investigation into existing practice as to the ratio which ordinarily exists between the freeboard and the length, breadth, and depth of the hull will be the best means of deducing a rule for determining the distance in question. The proportions which I am now about to cite are given merely as an example of the inquiry proposed to be instituted."

And further:

"As before stated, however, these assumed cases are given merely by way of illustrating a principle for determining a position for the freeboard gauge-mark before referred to, based on the dimensions of length, breadth, and depth, *and with reference to which the draught at which ships put to sea may be officially recorded.*

"As regards the regulations for enforcing the observance of such official rule as may be decided upon, it is submitted that the freeboard and draught, with reference to the said statute gauge-mark, shall be items of the official registration of every ship, and that the officer whose duty it is to clear ships for sea *take record of the actual load line with reference to the said statute mark at which ships actually leave port,* and that in the case of loss of life or other damage at sea, a deficiency of freeboard shall be sufficient to cause *special inquiry into the loading of the ship,* and, *if blamable,* place the damage in the category of damage caused by neglect, and subject to the penalties in such case provided, as in the case of a deficient complement of boats or other regulation equipment. One of the most striking deficiencies of the Act of '1854' is the absence of all legislative provision whereby proof may be established of the condition, as respects freeboard, in which ships actually put to sea."

And further:

"The Act of '1854' is defective, in so far that the prescribed registration, though called tonnage, takes no direct cognizance whatever of the tons weight of cargo that will either sink the ship, or that will immerse a ship down to any definite gauge-mark. The consequence is, that a ship chartered for the conveyance of merchandise may be filled with some descriptions of goods without being half loaded, or sunk with other descriptions of goods without being half filled. To remedy this deficiency, it is necessary not only that the registration shall give the capacity of a ship for *holding cargo,* as is done by the present law, but also the capability for *carrying weight of cargo* as determined by the weight that will sink a ship down to a given gauge-mark, to be fixed upon the stem and stern or amidships of every ship.

"The Act of '1854' is defective, in so far that it prescribes no regulations whereby the draught of water at which ships *actually put to sea* may be officially inspected and recorded, with reference to a statute gauge-mark, as above described, to be fixed upon every ship; such record to be received as evidence in the case of questions subsequently arising as to the condition in which ships put to sea: for the want of which record many of the provisions of the Act, evidently intended for the protection of life, become futile for want of proof as to the freeboard with which ships put to sea.

"It is submitted that the official imposition of a gauge-mark to be fixed on the stem and stern of ships, or amidships, for the purposes above referred to, would, of itself, *without any interference whatever on the part of Government officers in the loading of ships,* tend greatly to the prevention of overloading, whereby ships are rendered

unmanageable, and life endangered. The provisions of the Act for the protection of life would then become operative instead of being a dead letter as respects the overloading of ships."

Thus it appears that my proposal is to fix a statute gauge-mark on every ship, by reference to which the external measurement should be registered, and the load water line at which ships *actually leave port* should be recorded: for example, load line —— inches above or below the gauge-mark. My suggestions of rules for determining the position of such gauge-mark are given, not as a proposed law of freeboard by which the loading of ships should be limited, but as a datum, by reference to which the actual loading might be recorded. I have thus expressly disclaimed the very objects in regard to freeboard which you have attributed to me. Such are the circumstances under which the British Association has again recognised the glaring deficiencies of our present registration of shipping, and under which the General Committee has now declared and issued the following resolution:

"It having been found that the application of science to the improvement of steam ships has been impeded by the difficulty of obtaining the necessary data from the present registration: Resolved, that a committee be appointed and authorized to communicate, if necessary, with the Board of Trade on the subject: the committee to consist of Admiral Moorsom, Mr. J. S. Russell, Mr. J. E. M'Connell, Mr. Charles Atherton, Mr. William Fairbairn, Mr. J. Perry, Mr. Henry Wright, and Mr. Henderson."

I am, Gentlemen, yours, &c.,

CHAS. ATHERTON.

Woolwich Dockyard, Oct. 19, 1857.

[We insert Mr. Atherton's letter in reply to our editorial remarks in No. 1781, actuated by that spirit of fairness which we believe we have always exhibited, and willing to let any person, whose sayings or doings we impugn, tell his own story in his own way.

At the outset we beg to state that we are willing to let Mr. Atherton call us by any names he pleases, and impute to us whatever motives he pleases, relying, as we may fairly do, upon the character for disinterestedness and impartiality which we have justly earned, and which no hard words of his can affect.

As to the general tenour and meaning of that gentleman's last Paper, our readers are as well capable of judging as ourselves, as we have published in our pages all the material portions of it—omitting the tables certainly, not wishing to encumber our space with what appeared to be wholly unnecessary—but giving fully the principle on which they were calculated, and which it now appears, from Mr. Atherton's own showing in the preceding letter, we announced with the utmost fairness and impartiality.

To our extreme surprise we learn that we have received a letter from this gentleman, "challenging" a certain "procedure" on our part, which seems to be, as far as we collect, "imposing on our readers by attributing to him statements which he has not expressed, and motives which he disavows." Now the only letter we have received from him is one of a very few words requesting us, as we have already said, to complete our publication of his paper by inserting these tables, and intimating his intention thereupon of making a reply. Not a word is there in it about any other matter; and the only reason we did not publish the paper alluded to *in extenso* was because half of it was a formal description of a previous paper to which it referred (already published by us) and we wished to economise space. Not a word, however, of such "a challenge" as is stated by Mr. Atherton is contained in his letter to us. And on account of inserting only the purport of this letter (which we did fully enough) and not the letter itself, we are accused of "gagging" the "*Mechanics' Magazine* press!!" The accusation is utterly false and unfounded.

We are not surprised at hearing our fair comment on Mr. Atherton's proposals styled "Evasive Burlesque," as it is always easier to reply by invective than by argument, and we may well leave the matter to the judgment of our readers, who have the original (minus the tables) to refer to. With regard to the imputation of "exercising an editorial prerogative" not "in accordance with truth" as "advocate to a party," and "publishing perversions of our opponent's case," as we have really published his full case complete, and have given only what we believe to be a fair criticism on it, we can afford to let this go for as much as it is worth. We have already had occasion to show how readily Mr. Atherton's virtuous indignation is excited, and our readers must also well remember how, on one memorable occasion, words which, to all the rest of the world, meant a great deal, in Mr. Atherton's view meant nothing.

In our Review, in No. 1781, we stated facts; Mr. Atherton replies with invectives;

we are well content with that division of the argument which falls to our share.

We have no intention whatever to re-open the case which the late Tonnage Committee fairly, and, we had supposed, finally disposed of; and it was as desiring to avoid such superfluous discussion that we published our intention of exercising our "prerogative of judging if any part, or how much of Mr. Atherton's reply was likely to interest our readers, or worthy of their attention."* Nor do we intend now to allow ourselves to fall into this snare. However, with regard to the "circumstances" under which the new committee was appointed, we are ready to enter the lists with our indignant opponent.

Mr. Atherton is very ready to accuse us of "leading our readers away" from the real point at issue. How does he characterize his own reiterated attempts to make it appear that we deny what he is pleased to call the "deficiency of our registration system?" Of course we have never denied, but have over and over again in these pages reiterated, that the present registration does not embrace the points which he enumerates: and that is all that is stated in the Report of the Tonnage Committee. When it says that "the present method gives no measure of the power of a ship to carry weight," who could doubt so self-evident a proposition? The real question is, whether it is possible to assign such measure on acknowledged scientific principles. The same observation applies to the statement with regard to engine power.

This is the real issue, which we will not be so discourteous as to say Mr. Atherton wilfully puts out of sight "in order to impose on our readers," but which he certainly with a persevering blindness to which we have never met a parallel, does contrive to forget and overlook. If Mr. Atherton supposes that the *majority* of the committee committed themselves, or intended to commit themselves, to anything beyond a mere harmless, self-evident proposition in the words which he parades before our eyes, he is labouring under a monstrous delusion. But he is under no such delusion—he knows better.

One word with regard to the "approbation" expressed by the British Association and Society of Arts. We did not assert that the paper read at the Cheltenham meeting was not printed among the Reports by the advice of the mechanical section. We only pointed out the absurdity of that section committing itself, without due and proper enquiry, to Mr. Atherton's extravagances, and elevating them to an honour to which they are not entitled. If the Society of Arts, by bestowing a silver medal on Mr. Atherton for his wonderful paper of January, 1856, which received its due meed of "exposition" at our hands, intended to pledge itself to the several matters therein contained, we can only regret that that useful society should have committed so great a mistake, and taken a step calculated to diminish the value which ought to be attached to its silver medal.

The mischief arising from the overhaste of both the bodies in question in stamping with their approving mark most questionable dogmas, without full inquiry first had, is palpably shown in the position which Mr. Atherton thinks himself entitled to hold in consequence. Nothing ought to pass current with those societies but what has the genuine ring of sound science.

Mr. Atherton wisely limits his answer to *our facts* with regard to the formation of his committee at the last meeting of the British Association to the unmeaning sentence, "It becomes a curious subject of inquiry to trace out the device by which the Editor of the *Mechanics' Magazine* is thus attempting to impose on his readers the preposterous imputation that the Committees of the British Association have permitted themselves to be unworthily tampered with in the discharge of the duties assigned them." Preposterous or not, no one knows better than Mr. Atherton himself, that every word we asserted with regard to the formation of his committee and the opposition of the statistical to the mechanical section in this matter is true. Let him deny it if he can. He knows too well, however, to presume to follow so "preposterous" a course!

We are not to be led off from the real question at issue, by following Mr. Atherton into his already ten times discussed propositions. We have shown that he endeavours to place the matter in dispute on a false issue, and we commend to his notice the letter of "Nauticus" which appeared in No. 1782, and which contains much which might provide him useful food for reflection, and open his eyes to truths which seem never to have been dreamt of in his philosophy. We can only say that, in commenting upon his recommendations with regard to freeboard, we quoted his own words; and that there is no force whatever in the inferences which he deduces from his tables, if the rule on which he calculates "Freeboard" is not perfectly sound. *If* his words were not intended to convey the meaning which alone we could extract from them, they afford another instance of that happy style which, under high-sounding words, to which the uninitiated do attach some

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* The length of the quotations in which Mr. Atherton has indulged in the preceding letter, shows clearly how likely he is to force us to the exercise of this prerogative.

meaning, is really intended to convey—nothing.

Now, to let our readers judge of the ingenuousness of our correspondent, whose soul so abhors all attempts to impose on the readers of our magazine—who is such a lover of the pure truth—who instinctively recoils from "perversion" and "garbled statements," we ask, who would not suppose, from the following extract from his letter, that Admiral Moorsom and himself were working together, and that the committee as now appointed was a consequence of their joint action? "Nevertheless," he says, "these resolutions as to the fact of the deficiencies of the existing registration, combined with the additional papers presented to the Association by Admiral Moorsom and myself, dissipate the mysterious halo of unworthy influences which you attribute to the British Association."

But how stand the facts of the case? Admiral Moorsom, without any concurrence whatever with Mr. Atherton, as we understand, read a paper before the mechanical section, which induced that section to recommend a committee consisting of Admiral Moorsom, Mr. Scott Russell, Mr. Mc Connell, Mr. W. Fairbairn, and Mr. W. W. Smith, to collect statistics relative to the performance, &c., of vessels at sea, no reference whatever being had to the existing registration. In the meantime, as we stated before, the statistical section, acting in direct opposition to the mechanical section, recommended a committee consisting of Messrs. Atherton, Henderson, Perry, and Wright, to undertake the enquiry proposed by Mr. Atherton, with which the mechanical section would have nothing to do.

How the general committee of recommendations came to amalgamate these two committees, it is not for us to inquire. Possibly they saw the absurdity of appointing a committee composed of such materials as that recommended by the statistical section, and could find no way out of the difficulty, but throwing the two committees into one. But we must beg most emphatically to distinguish between the objects of Admiral Moorsom's committee and Mr. Atherton's. The former would probably result in some useful contribution to the sciences of naval architecture and steam navigation; and we cannot congratulate the distinguished men of science of whom it was to be formed upon the hybrid character their committee has acquired by the heterogeneous mixture with it of the four worthies of the statistical section. How far the good which they would probably have done to the cause of science by their inquiry will be compromised by the strange company in which they now find themselves, it is premature to say. But what a gross "*suppressio veri*" is there in Mr. Atherton's account of the "circumstances under which the British Association has again recognized the glaring deficiencies of our present registration of shipping!" As Mr. Atherton says, it becomes a "curious subject of inquiry to trace out the device" by which the committee was recommended to the statistical section, and by which the general committee was induced to swamp the really useful committee recommended by the mechanical section, by the addition of such an incongruous party.

Again: for another example of our irate correspondent's ingenuousness and love of truth. He parades a letter forwarded by the late Tonnage Committee to Professor Phillips, applying through that gentleman to the Admiralty for certain information which he tells us explains his views on statistical freeboard. Which of the many views he has expressed on freeboard we are to accept as authentic is thus left in a state of extreme doubt. The determination of this nice point, however, is not probably a matter of very great importance. Well—the letter written in consequence to the Board of Admiralty produced no fruit, for alleged reasons, in which probably a *majority of the committee* acquiesced. Mr. Atherton tells us, "In the absence of the matter of fact data they sought for, the committee was *foiled in its attempts to mature and propose any definite remedy for the admitted deficiencies of the present registration system.* HENCE the decision of the committee 'to confine the report to those points on which a definite and almost unanimous opinion could be given.'"

Now, we cannot let Mr. Atherton wriggle out of the plain meaning of his words. It is all very well indignantly to repudiate his own statements, and to describe fair comments on their plain meaning as "evasive burlesque;" but this is a "thimble-rigging" dodge, to use his own elegant term, which will not succeed if attempted too often.

We are then given by Mr. Atherton to understand that the committee as a body was foiled in *an attempt* to mature and propose a definite remedy for admitted deficiencies of the registration, and that in consequence of their being so foiled they came to the resolution announced. Now, did the committee as a body ever sanction the principle on which it was proposed to provide this remedy? There was never *any general meeting* of the committee until the final one on the 27th of May, to consider and decide upon the final Report. The only means by which the opinions of the members of the committee were collected was by the answers to the eight queries proposed, and of the members of the committee. Two only,

Messrs. Atherton and Henderson, approved absolutely of any such attempt. Admiral Moorsom's assent was of a very qualified nature, and that gentleman can hardly be claimed as forming a part of Mr. Atherton's minority, while the only three other members who recorded their opinions, took a diametrically opposite view of the case.

So, then, the "committee," according to Mr. Atherton's view of the case, consisted of himself and Mr. Henderson; a very modest assumption truly! Perhaps that worthy will reply, that he speaks of the committee as represented at the weekly meetings in Buckingham-street; that is, by two or three of the members to whom the direction of the formal part of the proceedings was left, as living in the neighbourhood; but to claim for such a fraction of the committee the authority of the whole is simply preposterous. There was of course no means of collecting the sentiments of the whole body, including those who had not given a written opinion, as well as those who had, but by a general meeting.

Now we have every reason to believe that the decision of the committee "to confine the report to those points on which a definite and almost unanimous opinion could be given," formed no part whatever of the original report, as it ought to have done, if Mr. Atherton's account is correct,—that this decision was adopted in consequence of the committee being foiled in their attempt to obtain information from the Admiralty. The original report proposed to the general meeting was drawn—as no one knows better than Mr. Atherton—in a very different sense, embodying, in short, all the recommendations of that worthy himself. WHENCE, then, really was this decision of the committee arrived at? Because the question of the possibility of defining the load water-draught on scientific principles was fully discussed at their sixth general meeting, and the sense of the meeting was against Mr. Atherton and the proposed report on that point. HENCE, on account of the disapproval of the majority of the committee of any attempt to supply by law the "deficiencies" of the registration, and because that majority did not wish to press heavily upon their vanquished opponents, having attained their objects by simply omitting the paragraphs from the report which embodied principles to which they objected—HENCE the decision in question, which was drawn and placed in the report *for the first time* at that meeting.

Hence, too, viz., from a desire on the part of the *majority* not to disturb the harmony of the meeting unnecessarily, the addition of those truisms with regard to the measurement of tonnage and of engine power, to which Mr. Atherton triumphantly points as pledging the committee to his views, but which he knows very well were admitted simply because they did no such thing, and were, what we have characterised them—harmless truisms.

But for the attempt of Mr. Atherton to give another colour to the report; another explanation of the "decision" in question, we should not have entered upon this explanation, upon the accuracy of which we pledge ourselves, and which explanation we were bound to give after the challenge so unwisely given by Mr. Atherton in that paragraph of his letter which we have just quoted. The attempt itself we will not characterize, lest we should seem to use hard language: we will leave our readers to do this for themselves. Perhaps they will not be surprised after this at Mr. Atherton's familiarity with the language of "thimble-riggers," and his readiness on all occasions to attribute to his opponents want of "truth" and candour, a desire to "impose" on the public, to "pervert" their opponent's case, and so forth.

We challenge any one to prove that the facts are not as we have stated, and as Mr. Atherton dare not deny: and this being the case, we plead guilty to the charge of libel on the well known axiom, "the greater the truth, the greater the libel," and are well content to compensate for the benefit we do to the public by "exposing" such dodges, by submitting in our own proper persons to a good round share of abuse.

In conclusion, one word, and one word only, with regard to the advertisements of the *Lightning*, *Ganymede*, *Alma*, *Sardinian*, *Anglo-Saxon*, and *Ava*, which it seems we ignored. Now, really the proposal of Mr. Atherton, *à propos* to these vessels, to render the use of the "builders' measurement" tons burden, &c., in advertisements and private contracts illegal, and to subject, consequently, owners and builders to pains and penalties in case they should choose to retain their predilection for these measures, seemed to us so utterly preposterous, that we could hardly think even him in earnest in making such a proposal. There is, as Mr. Atherton well knows, but one legal register of tonnage. But for Government to step in between the builder and customer and require them to exclude from their contract modes of measuring the work which experience may have proved convenient, and to require them to adopt one particular measurement which may not be so convenient for their purpose, is certainly "to impose legislative restrictions on the commercial management of shipping,"—"vexations" too, we should term them,—

which Mr. Atherton is now so anxious to repudiate. We never, however, called these advertisements a "figment of that gentleman's teeming brain;" for, as he says, we simply "ignored" them. The vessels which he placed in his table with the several "constructive elements," including freeboard, on which particular elements most important consequences were based, and which elements were all calculated on one "Chinese" uniform system, are now confessedly not palpable realities; not vessels which possess a genuine existence in wood or iron; and we are, therefore, at a loss to conceive why Mr. Atherton should be angry with us for calling them by the only name to which, by his own showing, they are entitled —Eds. M.M.]

RAILWAY SIGNALS BETWEEN PASSENGERS AND ENGINE DRIVERS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Allow me to describe a method of effecting a communication between the passengers and guards and engineer of a railway train.

Immediately under the eye of each guard and the engineer fix a small cylinder and piston; these are to be connected by means of a tube which shall run along the train; in each compartment let there be a string or lever leading to a cock in the tube; the tube and cylinders to be filled by means of a small air pump worked by the engine. When the train starts the pistons all ascend to the extent of their strokes, the surplus air escaping by a suitable valve. Should the guard wish to communicate with the engineer, he opens the cock and lets out the air; down go all the pistons, and as the one on the engine descends it opens a whistle on the boiler. Should a carriage take fire, or a passenger be attacked by a maniac or an assassin, if the handle or string be pulled a cock is also opened, and down go the pistons, and the whistle is sounded. A simple contrivance liberates a small flag on the roof of the carriage, immediately over the party opening the cock, on the cock being opened, and thus enables the guards to find the exact spot where aid is required, in the day time at a glance, and in the night a shade might be made to darken part of the lantern at the same time the flag is liberated. Thus might aid be quickly rendered, or a person "larking" be detected.

I am, Gentlemen, yours, &c.

J. Simon Holland.

Woolwich, Oct. 23, 1857.

[The following plan, which was patented 30th Sept., 1856, by Messrs. Dillon and Gray, of Dublin, and has recently been noticed at length in the daily journals, resembles that of our correspondent in its general character, although the mode of action is reversed. We think, however, that Mr. Holland's plan of forcing air through the tube is preferable to the exhausting process of Messrs. Dillon and Gray, being less liable to derangement. A metal pipe, $\frac{3}{8}$ in. diam. is secured under each carriage, a flexible tube with telescope connections being attached to the ends of each carriage tube to connect the whole when making up the train. One end tube is fixed on the guard's van, and connected with a small exhausting pump, to which motion is given from the axle. The other is connected with a cylinder, in which a piston and its rod plays freely, but air-tight. This cylinder is reversed, the piston rod being pointed downwards, and is placed on the engine in front of the driver, and on a level with his face, and there is attached to the pision rod a red bar, or semaphore, to which motion is given by the rod. The motion of the train causes the pump to act, and to maintain a constant exhaustion in the train tube and cylinder, the result of which is that the piston rod is forced up into the cylinder, and the red bar or semaphore following its movement, is withdrawn from the view of the driver. The mechanism is now in the condition to give signals, and this is its constant condition when the train is moving. The free admission of air into the train tube at any point destroys the exhaust within the tube and the cylinder, and throws down the red semaphore, or danger signal, before the eye of the driver. A stop-cock placed on the tube in the guard's van enables that officer to give the signal at any instant; and a branch pipe, projected into any of the carriages, with a cock protected by a piece of glass four inches square, enables any passenger to do the same. This bar or semaphore, is sometimes fixed on the square head of a cock that works in a steam pipe which issues from the boiler, and terminates in a powerful whistle. It was stated at the British Association by Lord Otho Fitzgerald, a young nobleman of considerable scientific reputation, that his Excellency the Lord Lieutenant, when recently visiting the west of Ireland, repeatedly stopped the train in which he was travelling by signals thus given by himself from the state carriage.—Eds. M. M.]

BOILER EXPLOSIONS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Noticing the many explosions and other accidents that happen to steam boilers through deficiency of water, I think the apparatus represented in the accompanying sketch might be useful in preventing some of them. It would also give warning if the boiler became too full.

I am, Gentlemen, yours, &c.,
A Tyro.

London, Oct. 23, 1857.

Description of Engraving.

a is a case fixed on the top of the boiler; *b*, a boiler; *c*, a float; *d*, a rod connecting the valve at *e* with the float, *c*. A curved spring is placed behind the valve to keep it steam-tight with the case, *a*. The rod is guided by guides, as shown. A glass tube might be fixed on the top of the case, and the rod, *d*, carried into it to form a water gauge; *i i* is the water level. Should the level of the water in the boiler fall below *i i*, the float will fall with it, opening the aperture at *e*, and allowing a small quantity of steam to escape at first, but increasing as the float falls, the aperture being, as I propose, in the shape of a diamond. Should the water level become too high, the float and valve will rise and allow of the escape of steam from below the valve. Two small holes might be made above and below the aperture, and furnished with two small whistles, to give notice of the rise or fall of the water.

DRAKE'S IMPROVEMENTS IN CANNON.

To the Editors of the Mechanics' Magazine.

Gentlemen,—An old experienced gunner observes, "I clearly understood that your duplex breech gun will fire with rapidity and safety, and that one movement of the breech only is required for loading and firing; but I am not a believer in the American assertion that, with its six movements for loading and firing the American gun, No. 1774, '*before one shot reaches the object another is on the road.*' This may pass among our transatlantic competitors, but it will not go down on this side the Atlantic. I am decidedly of opinion, with the same number of men, the old loading at the muzzle gun can be fired quicker; but by all means, now the imported guns are removed to Shoeburyness, let the Woolwich Select Committee give every assistance to the American inventor to fire, '*quicker than lightning*,' if he thinks he can. I think the readers of the *Mechanics' Magazine* in general do not see sufficiently clear, by your description, that your breech moves but once for each discharge, and you must remember they are not all acquainted with the firing of cannon."

Permit me to say, on looking at the ground section of the duplex breech in No. 1779, it will be seen that alternate loading on each side of the gun, gives but one motion to the breech for each discharge, as it is not intended to load the second chamber *till the first is fired;* and if it be a single chamber, it will involve two movements of the breech, *right and left*.

In the gun described in No. 1785, two movements of the working breech is also required, *one up and one down*, but quickly performed.

I am, Gentlemen, yours, &c.,
John Poad Drake.

London, Oct. 26, 1857.

AN IMPROVED BALANCE.

Gentlemen,—I think that a balance, and possibly a weighing machine on a large scale, if constructed on the following principle, would be an improvement:

For the former, an upright vessel should be provided, and contain a float lined with gutta percha to rest upon water placed therein. This should be caused to move up and down by means the most simple, and communicate with the body on which the weight is placed. It might take either of the forms of the common letter balance.

By using a tank and float, &c., proportionate, the latter machine might be constructed, using the ordinary combination of levers, and the great advantage of each would be the constant and unvarying nature of water.

I am, Gentlemen, yours, &c.,
J. A. D.

MISCELLANEOUS INTELLIGENCE.

De la Haye's Submarine Telegraphic Cables.—A meeting of engineers was recently held at the Town-hall, Manchester, to receive from an old and valued correspondent of ours (Mr. John de la Haye, of the firm of De la Haye and Bloom), an explanation of a new invention, for which he has taken out a patent, for submerging submarine electric cables. Mr. De la Haye said, the plan he would adopt would be to surround a cable prepared like that for the Atlantic Ocean with a light buoyant substance connected to the cable by tape bands made to adhere by a soluble compound (the composition of the compound he would not then mention), capable of floating it for a time on the surface of the water. The coating would hold it on the surface of the waves while about five miles of cable were payed out from the vessel before the compound began to dissolve, and as it would dissolve gradually, so the cable would sink gradually to the bed of the ocean. The cable would descend into the ocean almost horizontally instead of nearly perpendicularly. The above account of Mr. De la Haye's invention is correct; the newspaper reports of last week were not.

A Contrivance for the Detection of Burglary.—An invention has recently been patented by Mr. Turner, of Wolverhampton, and of City-road, London, for the detection of burglary. The apparatus is so constructed that it can be readily affixed to any house or set of offices. It is also adapted to gardens and pleasure grounds, iron safes containing valuable property, wine cellars, plate closets, jewellery rooms, &c. Its appearance is similar to a clock face, or the dial of an electric telegraph; and it is so contrived that no door, window, or gate to which it is applied, can possibly be opened without an immediate alarm being given by the ringing of a bell; at the same time a match is struck which lights a candle, thus enabling the inmates, by the face of the indicator, to know what particular apartment has been entered, and also indicate the progress of the unlawful visitor through the premises. A general alarm may be given by it to the inmates by the watchman, or person in whose room the dial is placed (unknown to the depredator), thus enabling them to prepare for his capture. The apparatus forms an ornament to the room, requires but little space, and after fitting costs next to nothing.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Newton, W. E. *Improved machinery for turning articles of irregular forms in the direction of their length.* (A communication.) Dated Feb. 12, 1857. (No. 416.)

This is mainly intended for turning the tips for umbrella whalebones. The block to be turned is shifted from one to another of a series of cutters, each of which operates upon the entire length to be turned, gradually reducing the block to form, and there is a series of mandrils so that a series of blocks may be operated upon at the same time.

Gimson, G. *Certain improvements in steam engines.* Dated Feb. 12, 1857. (No. 419.)

This relates to slide valves, and consists principally in making both the seating and the face of the valve or covering for the steam ports of a circular form, that is, of the form of any segment of a circle, and the valve-spindle or axle covering a portion of the back of the valve, and working on the centre of such circle or cylinder. The valve opens and closes by an alternate rocking or reciprocating motion upon its axis, imparted through the valve spindle from the main driving shaft of the engine by well-known "valve motions;" the back of the valve is also in a circular form, so that the steam may exert an equal pressure upon all sides of the valve.

Wingate, T. *Improvements in screw propellers, and in adjusting the same.* Dated Feb. 12, 1857. (No. 420.)

This relates to so constructing propellers that, whilst the blades are adjustable to any working angle with the axial line of the propelling shaft, they can yet be fixed firmly down in whatever position may be assigned to them whilst the ship is afloat.

Crossley, C. and J., and D. Leeming. *Improvements in apparatus for heating and in taps to be employed in combination therewith, which taps are also applicable for general purposes.* Dated Feb. 13, 1857. (No. 422.)

This cannot be described without engravings.

Richardson, W. *Improvements in the use of iron or any other metal by itself, or in combination with other materials for structural purposes.* Dated Feb. 13, 1857. (No. 424.)

This consists in the use of metal in segments bolted together in combination with a lining of bricks, tiles, or any kind of pottery, or concrete, or wood. The whole forms an air and water-tight structure of great strength.

Sykes, F. H. *An improved apparatus for supplying or feeding boilers with water, ap-*

plicable to raising and forcing liquids for other purposes. Dated Feb. 13, 1857. (No. 425.)

This consists of a pair of cylindrical vessels closed at the top and bottom; a pipe leads from each of the vessels, and is connected with valves. There are two of these valves, each having four ports in the valve seat and two in the valve; two ports are always open and two closed. To each of the valves are secured two pipes, which communicate with the ports. A pipe from each valve is carried into the boiler, one entering the lower part of the boiler and the other the upper; hence, one conveys steam into the cylindrical vessels and the other water from them into the boiler. One of the other two pipes connected with the valves conveys the water from the reservoir to the cylindrical vessels, the other carries away the steam from the vessels to a condenser.

LAMB, D. A. *Improvements in water closets, and in apparatus connected therewith.* Dated Feb. 13, 1857. (No. 426.)

Beneath the seat is a stud, which is depressed by the sinking of the seat. This stud is connected with a lever which opens the inlet tap of the cistern and closes the emission valve of the basin. When the pressure on the seat is removed the supply tap is closed by a metal float, and the emission valve in the cistern opens and discharges the water contained in the cistern into the basin; the quantity of water discharged is regulated by the size of the cistern.

SMITH, N. C. *Improvements in the disc engine.* Dated Feb. 13, 1857. (No. 429.)

This consists of improved methods of supporting the disc in order to ensure steam-tight bearings.

HALLETT, M. W. *Improvements in apparatus for securing window and other openings in buildings.* Dated Feb. 13, 1857. (No. 430.)

Vertical bars are employed, ranged at a short distance apart across the window, but in place of being fixed, they are connected together so that they can be folded close to each other, and packed out of sight in the spaces at the sides of the window.

LAWSON, J., and S. COTTON. *Improvements in machinery for roving, spinning, or twisting flax, cotton, wool, and other fibrous substances.* Dated Feb. 13, 1857. (No. 431.)

The spindles are supported in steps on a step rail, and revolve in collars carried by a collar rail, and with the flyers receive the motion by gearing. The lower ends of the flyers revolve on the collars within which the spindles are supported. The lower ends of the bobbins have recesses in them to fix in bosses on the spindles. The bobbins are placed on the upper ends of spindles which rise to the tops of the bobbins. On the limbs of each of the flyers is a ring made to slide up and down to distribute the rove, (spinning or twisting) on to the bobbin, there being a hole through the ring through which the rove passes to the bobbin. The upper part of each of the flyers is formed with a top capable of being removed for changing the bobbin. On the top of the flyer is a short tube with a hole at one side, and another hole in the top of the flyer. The fibrous substance is passed down, partly through the tube, then through the hole in the tube, then through the opening in the top of the flyer, then through the hole in the ring, and is then wound on the bobbin.

HARDSTAFF, G. *Improvements in apparatus for actuating and applying the breaks of carriages used on railways and for coupling such carriages.* Dated Feb. 13, 1857. (No. 432.)

The apparatus is so combined that the carriages of a train are at all times kept at an equal distance apart, and all the brakes are simultaneously put into action by the piston rod of a steam cylinder applied to the locomotive.

HOUCHIN, R. jun. *Improvements in alarums.* Dated Feb. 13, 1857. (No. 433.)

This invention can scarcely be understood without reference to the specification itself.

COCKER, J. *Improvements in, and apparatus for, the manufacture of wire, part of which improvements is applicable to the annealing of other metallic articles.* Dated Feb. 13, 1857. (No. 435.)

This relates—1. To improvements upon the annealing furnace and apparatus patented by Mr. Cocker, 10th Dec. 1855. 2. To improvements on the machine for scouring or polishing wire, patented as aforesaid. 3. To the cleaning of wire by the vitriol process, the object being to ensure an equable action of the acid on all the wire composing one batch, and also greatly to simplify the manipulation of the process. 4. To the pointing of the hanks in order to permit of their ends being readily inserted into the dies. 5. To the lubricating of the ordinary wire drawing plates or dies, the object being to enable one workman to attend to two or more dies at the same time, and also to produce a better result.

WALKER, A. B. *An improved apparatus for heating fluids.* Dated Feb. 14, 1857. (No. 437.)

This cannot be described without engravings.

CRUIKSHANK, J. *An improvement or improvements in rolling iron and steel wire.* Dated Feb. 14, 1857. (No. 440.)

This consists in rolling iron and steel wire by means of rolls to which two, three, or more different velocities are given, the said rolls working at the same time in the same mill or otherwise, that is to say, the rolls between which the heated rod is passed move with greater velocity, in proportion as the grooves in them are less, that is, as its diameter diminishes.

FIRTH, J., and J. CRABTREE. *Improvements in power looms for weaving fancy goods.* Dated Feb. 14, 1857. (No. 441.)

This applies to power looms wherein moveable tiers of shuttle boxes are employed for bringing the shuttles to the level of the shuttle race as the pattern may require, and consists principally in regulating the changes of the shuttles by means of the ordinary Jacquard machine.

SMITH, A. *Improvements in machinery for the manufacture of wire rope and other ropes.* Dated Feb. 14, 1857. (No. 442.)

This refers to a horizontal rope-making machine in which the bobbins or reels containing the wires or strands are placed in frames turning on pivots within a revolving skeleton cylinder, and so arranged that the wires are subjected to a less number of bends than heretofore in passing from the reels to the "laying plate."

TAYLOR, J. *Improvements in the preparation or manufacture of manures.* Dated Feb. 14, 1857. (No. 443.)

This consists in the production of manure by mixing the waste grains and hops, after use by brewers or distillers, with animal matter.

COOKE, W. *Improvements in apparatus for ventilation.* Dated Feb. 14, 1857. (No. 445.)

This consists—1. In a method of constructing ventilators of wire gauze or other perforated material, to be fitted to the sash of a window or door, in place of squares of glass.

JACKSON, W. R. *An improved railway break.* Dated Feb. 16, 1857. (No. 447.)

This cannot be described without engravings.

NEWTON, W. E. *Improved machinery for manufacturing nuts and washers.* (A communication.) Dated Feb. 16, 1857. (No. 448.)

This relates to dies used in machines for forging and swaging nuts, washers, &c., and consists in manufacturing these dies of chilled cast-iron.

NEWCOMB, T. *Improvements in machinery for manufacturing nails.* Dated Feb. 16, 1857. (No. 450.)

The machinery is arranged first to cut off a length of metal which has parallel sides, and which is next passed between two rollers, one of which is placed eccentrically on its axis, or is fixed c[illegible]trically and its axis has a motion to and fro. [illegible]hese rollers taper the length of metal to a po[illegible]. As it passes from the rollers it comes [illegible]inst a fixed die, between which and a movea[illegible] die it is held whilst the heading die (acted on by a cam) produces the head.

WILEY, W. E. *Improvements in the manufacture of metal pens and pen-holders.* Dated Feb. 16, 1857. (No. 451.)

In making a metal pen, the upper part above the shoulders is made hollow, having on either side a flanch, to suit it for the holders hereafter described. The hollow portion of the pen is slit longitudinally and at intervals transversely. The nibs are bevelled off inside from the point to a short distance up, and from the split outwards. Pen-holders are formed of polygonal tubes, the outer edges of the pen being received in two angles of a holder.

QUICK, J., jun., and A. FRASER. *Improvements in apparatus for regulating the drawing off and the supply of water and other fluids.* Dated Feb. 16, 1857. (No. 452.)

To the main supply is connected a vessel which has a valve at its upper part, opening inwards, and closed by the water rising in the vessel. The vessel has an outlet connected with the supply pipe that the same plug may be used to admit the fluid into and out of the vessel. For this purpose the plug has a passage through it, which can be made to communicate between the supply pipe and the vessel at one time, and at another between the vessel and the outlet, but not to communicate between the inlet and outlet; the fluid can therefore only be drawn off from the vessel, and not direct from the supply.

PARKES, A. *Improvements in the manufacture of nails.* Dated Feb. 16, 1857. (No. 453.)

This consists in making cup or hollow headed nails of wrought metal, such having hitherto been made by casting.

JOHNSON, J. H. *Improvements in machinery or apparatus for the manufacture of pasteboard.* (A communication.) Dated Feb. 16, 1857. (No. 454.)

This relates to apparatus for reducing "half stuff" to a suitable fineness for pasteboard pulp, and also to apparatus for pressing and forming such pulp into sheets. These apparatuses cannot be briefly described.

CLARK, W. *Improvements in the manufacture of railway chairs.* (A communication.) Dated Feb. 16, 1857. (No. 455.)

Chairs are first made in the form of a bar of wrought iron in which the space to receive the rail forms a groove throughout its length. This bar is cut transversely at suitable distances to form a number of

[illegible]nufacture a series of
chairs. In th[illegible]ed as in the ordinary ma-
rolls are em[illegible] bar iron, but with the form of
nufactu[illegible] adapted for the purpose required.
gro[illegible] bar is cut while red-hot by means of a
saw.

Ball, T. *An improved portable oven for baking bread and other articles of food, in the camp, the field, or the house.* Dated Feb. 17, 1857. (No. 456.)

This relates to a portable apparatus for baking in camp or field, or in any building where there is free ventilation. It consists of a case of iron containing an arrangement of conical, heating, and cooking chambers.

Cowper, C. *Improvements in making drains, and in machinery for that purpose.* Dated Feb. 17, 1857. (No. 458.)

Claims—1. Making drains by making a series of vertical holes, and a horizontal hole from one vertical hole to another by a boring tool worked from above the surface of the ground by means of apparatus communicating with it through the vertical holes as described. 2. Making drains by making the vertical and horizontal holes as aforesaid, and drawing in the drain pipes by attaching them to the boring bar as described. 3. Making drains by making the vertical and horizontal holes as aforesaid, and then lining the inside of both the vertical and horizontal holes, or either, with a plastic composition introduced round a mandril, which is afterwards withdrawn, as described. 4. Making drains by making the vertical and horizontal holes as aforesaid, and then baking or hardening the lining of the holes by means of fire, as described. 5. A combination of parts forming a machine for boring the vertical holes, as described. 6. A combination of parts forming a machine for boring the vertical holes, as described. 7. Various combinations of parts forming different machines for boring the horizontal holes, as described.

Goodman, J. *Improvements in apparatus for holding together letters, music, and other loose sheets.* (A communication.) Dated Feb. 17, 1857. (No. 459.)

This relates to a pamphlet holder or portfolio, in which springs are applied to the ends of a metal frame, work within the back, having knives or pins attached thereto, and a perforated bar to slide on the same, which retains papers in their place, after their being pierced by and pressed on to the pins or knives by the sliding bar.

Alcan, E. *Improvements in machinery for twisting, doubling, and spinning cotton, silk, and other fibrous materials.* (A communication.) Dated Feb. 17, 1857. (No. 463.)

According to this invention the bobbin is mounted in bearings in the bobbin frame, and rotary motion communicated by a bevel wheel in gear with a wheel on the driving shaft. Rotary motion is imparted to the bobbin by frictional contact with a cylinder actuated by spiral gearing on a shaft stepped in the bobbin carrier, and which is itself actuated by engaging into a threaded shaft made to rotate by suitable gearing. The journals of the bobbin bear against springs which yield as the thread, &c., is wound on (thereby increasing the circumference of the bobbin).

Barber, H. *Improvements in knitting-machinery.* Dated Feb. 17, 1857. (No. 464.)

This consists—1. In using a double-headed needle in which the head is formed of two hooks or beards placed back to back. 2. In the use of the Jacquard apparatus for working the pressers which close the beards or hooks of the needles. 3. In a means of working pressers to close the hooks or beards of the needles. The patentee proposes to fix the pressers in leads above the needle leads, above and parallel to the needles, and made to lie in grooves formed in the top of the needles, and enter under the hook.

Pascal, J. B. *An improved engine with rotary piston applicable to various purposes.* Dated Feb. 17, 1857. (No. 465.)

The principal characteristics of this invention are—1. A cylindrical case or chamber bored in the interior, and in which moves a rotary cylinder placed eccentric thereto. 2. The use of sliding plates or pallets arranged around the circumference of the moveable cylinder, which plates are fitted and slide in corresponding recesses, disposed in a position radial to the moveable cylinder, and extending along its whole length. 3. The method of closing of the lateral sides of the apparatus by means of a stuffing-box bearing, arranged so as to prevent the escape of water, steam, or air. 4. The use of air-tight elastic packings, composed of hard woollen, cotton, silk, India-rubber, asbestos, or other matters interwoven or arranged in parallel filaments; or of a metal band; or of a spring. These elastic packings are intended to avoid the complete steam-tight fitting of the pallets and slides. 5. The substitution of rollers for the bearings supporting the axis of the engine, so as to change the sliding friction produced by the collars into rolling friction.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

MAYNARD, E. *An improvement in calks for the shoes of animals.* Dated Feb. 12, 1857. (No. 415.)

The inventor constructs the calks with a tapering body, on the end of which is a screw thread. He then forms holes in the animal's shoe of a tapering form, and with a screw thread at the smaller end, and screws the calk into the shoe; the conical body in the conical hole sustains all the strain, and the blows of the animal's foot tend to tighten the whole.

NEWTON, W. E. *Improved machinery for cutting metals or other hard substances.* (A communication.) Dated Feb. 12, 1857. (No. 417.)

This consists in dispensing with the top beam of rotary shears, and in place thereof the carriage on which the moveable blade is mounted is supported entirely on the lower frame that contains the stationary blades. The carriage with the blade is actuated by toothed gearing, in such manner that the relative velocities of the parts can be changed or modified.

BOWCOCK, E. *Certain improvements in the manufacture of cords to be used in skirts and petticoats.* Dated Feb. 12, 1857. (No. 418.)

This relates to French skirt cord applied to petticoats to distend them, and consists in the arrangement of the threads of which such cords are composed. The inventor takes a number of straight threads or yarns for the foundation, and covers them by winding around from two to six threads of from two to six fold yarn or thread, and afterwards plaits backwards and forwards, or in reverse directions, a band or strip of sewing thread.

WILLIAMS, C. W. *Improvements in increasing the draught and promoting the combustion of the fuel in furnaces.* Dated Feb. 13, 1857. (No. 421.)

This consists in the employment of jets of air forced through tubes provided with small orifices, and placed in the furnace chamber or in the ash pit under the bars.

HARRISON, W. H. *Certain improvements in the machinery or apparatus as at present employed for raising water from mines.* Dated Feb. 13, 1857. (No. 423.)

On the top of the first plunger or bucket rod is a wrought-iron cross head, to each end of which is attached a side rod extending below the pump barrel. At the lower end of each of the side rods is a second rod, the connecting rod, or that part which is attached to the hank pin, forming the bucket or plunge rod for the next set of pumps, and so on throughout the whole series.

CLARK, W. S. *Improvements in machines for grating substances.* (A communication.) Dated Feb. 13, 1857. (No. 427.)

This cannot be described without engravings.

MAPPIN, W. S. *A new or improved method of constructing doors and windows for the prevention of burglary, which method of construction is also applicable to other articles where strength is required.* Dated Feb. 13, 1857. (No. 428.)

This was described at page 300 of our 66th volume.

ROBOTTOM, T. *Improvements in locomotive engines chiefly adapted for the purposes of common road or street traction, and the working of agricultural implements.* Dated Feb. 13, 1857. (No. 434.)

On the top of the boiler the inventor fixes pipes, supporting tubes which act in a steam chamber. He is by this arrangement enabled to ascend inclines with an ordinary locomotive boiler, as the level of the water is never lowered so much as to admit of injury to the tubes or fire box. At the back of the engine he employs two drums, upon which wire rope or chain is coiled; and to the bottom of the boiler he secures two pulleys acting as guides to the wire rope or chain. He can work two distinct machines at one time, and can employ two speeds by using change wheels.

WILLIAMS, J. *Improvements in apparatus for lowering and stopping anchor chains on board ships, and for other similar purposes.* Dated Feb. 13, 1857. (No. 436.)

This cannot be described without engravings.

FULTON, H. H., and T. B. ETTY. *Improvements in the generation and application of steam power for propelling, hauling, driving, or conveying, particularly applicable to farming purposes.* Dated Feb. 14, 1857. (No. 438.)

This consists—1. In constructing boilers of two distinct cylinders connected by pipes, one cylinder containing the fire box for the furnace and the other the flues or tubes. 2. In fixing on the driving or running wheels or axle of locomotives, inside and outside, toothed wheels of different diameters, with either of which a pinion worked by the engine is put into gear by a lever, thus either increasing or diminishing the speed of the said wheels. 3. In the application of a capstan or drum to locomotives, driven from the engine shaft, to assist in the traction, the capstan or drum being provided with grooves, around which anchored ropes or chains are wound.

FORREST, A. *Improvements in the construction and ornamentation of belt or band fastenings and other dress fastenings.* Dated Feb. 14, 1857. (No. 439.)

The inventor connects the ends of the fastenings by a catch fitted with a slide by

which the length of the belt can be altered as well as the fastening effected. He uses ornaments made of porcelain, glass, pearl, or coloured paper, and applies a covering of glass where desirable.

MOATE, C. R. *Improvements in the permanent way of railways.* Dated Feb. 14, 1857. (No. 444.)

This has reference to the manufacture of cast-iron longitudinal sleepers, and consists in constructing sleepers and sleeper chairs with the metal disposed in the form of a tube or hollow casting having a triangular transverse section.

LETESTU, J. M. *Improvements in signals.* Dated Feb. 16, 1857. (No. 446.)

This relates principally to danger signals for warning ships of rocks or sand banks, but is applicable in other cases. Bells, gongs, &c., are sounded by a windmill, or a watermill, or a float moved by the waves; or wind is caused to act directly on a whistle or trumpet.

CRAWLEY, J., sen. *Improvements in collars and wristbands.* Dated Feb. 16, 1857. (No. 449.)

This relates to a method of applying additional thicknesses of material to these articles for stiffening them at certain parts. Also, to a method of securing the upper edge of the article so that it may be more durable and at the same time more ornamental.

GREEN, H. *An improved stove to be heated by gas.* Dated Feb. 17, 1857. (No. 457.)

A gas stove is formed of an outer case, made double to contain water, or a slow-conducting material. Within this casing a series of vertical tubes are ranged round its circumference; these extend from the bottom to the top of the casing, and are for the passage of air, which, entering below, becomes heated, ascends, and escapes at the top.

BURSLEM, W. and J. *An improved picker to be used in power-looms for weaving.* Dated Feb. 17, 1857. (No. 460.)

This is particularly adapted to pick looms, in which the picking sticks have their fulcrum below the shuttle box. The novelty consists in the use of a wire framing, and in so forming the pickers that the striking parts or fronts shall oppose a good solid front to the points of the shuttle.

BENNETT, J. *A new or improved joint for fishing-rods, the rods or handles of parasols, and for other rods.* Dated Feb. 17, 1857. (No. 461.)

Upon the ends of the rods to be joined the inventor attaches a metallic ferrule, that on one rod being larger than that on the other, so that one of the tubes may slide in the other. The larger tube has in it a smaller one, so that the smaller tube or ferrule slides between two concentric tubes. The two rods are joined by a cylinder of India rubber, and the smaller tube is provided with a bayonet joint, in which a pin in the larger tube engages.

PROVISIONAL PROTECTIONS.

Dated September 23, 1857.

2468. William Power, of Rotherhithe, baker. Improvements in steam engine boiler furnaces and other furnaces for smoke prevention.

Dated September 26, 1857.

2483. Pascal Balboni, of Florence, Italy. A marine, submarine, and aerostatic propeller, being a new mechanism for propelling steam vessels on and in the water, applicable also to aerostatic purposes, combining speed and safety in steam-boats, and giving the power of directing balloons.

2486. Michael Henry, of Fleet-street. Improvements in the manufacture of artificial wine, vinegar, and brandy, part of which improvements is applicable in the manufacture of brandy generally. A communication.

Dated September 28, 1857.

2493. William Bowler, of Seymour-place, Bristol. Improvements in the manufacture of hats and other coverings for the head.

Dated September 29, 1857.

2496. Earle Harry Smith, of New York. Improvements in sewing-machines.

2500. Stephen Smith, of Manchester, tailor. Certain improvements in coffins. A communication.

2504. James Welch, of Southall, Middlesex. Improvements in carriage and portable railways, to facilitate their movement on common roads and other surfaces.

2506. William Edward Newton, of Chancery-lane. Improved apparatus for igniting gas or other lamps. A communication.

Dated September 30, 1857.

2510. Auguste Bouret, of Paris, gentleman. Improvements in Pecqueur's loom for manufacturing fishing and other nets.

2512. James Paisley, of Hele Works, Devon, millwright, and George Bertram, of Edinburgh, engineer. Improvements in the manufacture of paper.

2514. Christopher Crabb Creeke, of Bournemouth, Hants, architect and surveyor. Improvements in the construction or manufacture of earthenware pipes.

2516. William Sandilands, of Inveresk, N.B., smith. Improvements in chimney cans or apparatus for promoting draught in chimneys.

2517. William Henderson, of Bristol, chemist. Improvements in treating certain ores and alloys, and in obtaining products therefrom, and in recovering or reproducing all or part of the materials used.

2518. James Harris, of Hanwell, engineer. Improvements in and connected with cocks and valves, especially adapted to preventing the bursting of water pipes from frost.

Dated October 1, 1857.

2520. James Long and Joseph Long, of Little Tower-street, City, philosophical instrument makers. An improved method of, and apparatus for ascertaining and registering the depth of water and the pressure of steam.

2522. Josiah George Jennings, of Holland-street, Blackfriars, sanitary engineer. Improvements in

the manufacture of articles used for forming flues and air and water passages in buildings.

Dated October 2, 1857.

2526. Samuel Davies, of Brilley, Hereford, mechanic. Improvements in apparatus for heating the feed water of steam boilers.

2528. Henry John Childe Shakespear, captain H.E.I.C.S. An improvement in the structure of carriages for military and other purposes.

2530. George Webster Shibles, of Thomas Town, U.S., mariner. Improvements in arranging and reefing the sails of ships.

2532. Joseph England, of Beverley, machinist. Improvements in washing-machines.

2534. John Henry Johnson, of Lincoln's-inn-fields. Improvements in the construction of iron bridges. A communication from F. C. Lowethorp, of Trenton, U.S.

Dated October 3, 1857.

2538. John Atherton Molineaux and Joseph Nichols, of Brighton. Improvements in pistons for steam engine and other cylinders.

2540. Augustus Seyferth, of Paris. The employment of sulphuret of carbon for motive purposes, and engines and apparatuses for applying and regenerating the same.

2542. William Pursall, of Birmingham, manufacturer. Improvements in the manufacture of eyelets.

Dated October 5, 1857.

2544. George Duncan and William John Jellicorse, printing machine manufacturers, of Birmingham. An improved smoke-consuming furnace.

2546. Charles Reeves, of Birmingham, manufacturer. A new or improved sword.

2548. Robert Atkinson, of Newcastle-on-Tyne, shirt-maker. Improvements in garments as part of male attire.

2550. Michael Henry, of Fleet-street. Improvements in apparatus or machines for raking and scraping or cleaning roads, streets, ways, and places. A communication from M. Marmet.

2554. Athanase Victor Constant Regnauld, of Paris, gentleman. A universal preservative medicine.

Dated October 6, 1857.

2556. John Talbot Pitman, of Gracechurch-street. Improvements in apparatus for making candles and other analogous manufactures. A communication.

2557. Richard Hugh Hughes, of Hatton-garden, manufacturer. Improvements in hydraulic connections of gas chandeliers, lanterns, or pendants.

2559. Edward Vigers, of Bayswater, gentleman. Improvements in the construction of wrought iron beams and girders.

2560. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent-agent. Improvements in apparatuses for taking photographic pictures. A communication from Mons. Garella.

2561. Conrad William Finzel, of Bristol, sugar refiner, and James Bryant, of Plymouth, sugar refiner. Improvements in cleansing animal charcoal, and in removing iron and other impurities therefrom.

2562. James Stoneham, of Audenshaw, near Manchester, and John Pipler Lees, of Ashton-under-Lyne. Improvements in uniting or connecting piping.

2563. George Thomas Robinson, of Leamington Priors, Warwick, architect. A machine for obliterating postage stamps on letters, at the same time stamping the post marks and registering the number of letters so stamped.

2564. William Knapton, of Monkbar, York. Improvements in gasometers or gas-holders, and in the application thereof to railway and other carriages and ships, for lighting the same with gas.

2565. Augustus Applegath, of Dartford, Kent. Improvements in printing-machines.

2566. James Warburton, of Addingham, York. Improvements in combing wool and other fibres.

2567. Ebenezer Stevenns, of Cambridge-road. Improvements in machinery for making bread and pastry and other similar articles.

2568. Robert Romaine, of Beverley, gentleman. Improvements in machinery for digging or cultivating land, part of which improvements is applicable to agricultural steam engines generally.

2569. William Gossage, of Widnes, Lancaster, chemist. Improvements in the manufacture of sulphuric acid.

Dated October 8, 1857.

2570. Alexander Boyd, of Lees Brook, near Oldham, machine-maker. Improvements in machinery for spinning and doubling.

2571. Thomas Forsyth, of Manchester, engineer. Improvements in the construction of metallic pistons.

2573. Job Allen, of Commercial-road, engineer, and John Young, of Shadwell, mechanic. Improvements in preventing oscillation in carriages upon railways.

2574. Thomas Grubb, of Dublin, engineer. An improved photographic lens.

2575. Charles Barlow, of Chancery-lane. Improvements in buoyant or life-preserving garments. A communication.

2576. William MacNaught, of Rochdale, and William MacNaught, of Manchester, engineers. Improvements in steam engines.

2577. William Grindley Craig, of Gorton, Lancaster, engineer. Improvements in the manufacture of railway carriage and other wheels formed of cast metal, or having cast metal naves or bosses.

2578. Daniel Reuver, of Brussels, gentleman. Improvements in propelling and steering ships and other floating bodies.

2579. James Cocker, of Liverpool, wire-drawer. Improvements in the manufacture of wire.

2580. William Richard Todd, Jun., of Hull, colour-manufacturer. Improvements in manufacturing or preparing washing blue.

2581. James Cocker, of Liverpool, wire-drawer. Improved apparatus for heating or annealing wire, wire iron or rods, or sheets of iron or other metals.

2582. Elbridge Foster, of Connecticut, U.S. A new and useful or improved life-preserving berth for navigable vessels.

2583. Thomas Massey, of Birchin-lane, and Thomas Savage, of Soley-terrace, Pentonville. An improvement in apparatus for ascertaining and recording the speed of ships.

2584. James Wadsworth, of Hazelgrove, near Stockport, machine-maker. Improvements in the production and management of artificial light and heat, and in certain parts of apparatus applicable thereto.

Dated October 9, 1857.

2585. George Scott, of Philadelphia, U.S. Improvements in steam generators.

2586. Samuel Walmsley, of Heaton Norris, Lancaster, agent. Improvements in the construction of footsteps for upright shafts and spindles.

2587. Fennell Herbert Allman, civil engineer, of Mornington-place, Regent's-park. Certain improvements in the construction of valves and taps.

2588. Richard Davies, of Newcastle-on-Tyne, marble mason. Improvements in washing-machines.

2589. John Harland, of Newcastle-on-Tyne, timber merchant. Improvements in purifying and cleansing clay, and in the manufacture of bricks, tiles, and similar articles therefrom.

2590. Antoine Marie Poisat, of Paris, manufacturer. A machine for preparing wood to be reduced into pulp for the manufacture of paper, card, and pasteboard. A communication.

2592. Henry and William Brown, coach-trimmers, of Albert-street, Newington Butts. An improved whip socket.

2593. William Edward Newton, of Chancery-lane. Improvements in stirrups or stirrup irons. A communication.

Dated October 10, 1857.

2594. Charles Barnard and John Bishop, of Norwich, ironmongers. An improved washing-machine.

2595. Francis Alton Calvert, of Manchester, engineer. Improvements in machinery for ginning cotton and for burring and cleaning cotton, wool, and other fibrous materials.

2596. George Miller, of Salford, machinist. Improvements in apparatus for heating and ventilating.

2599. Alfred Barlow, of Leeds. A Jacquard apparatus, dispensing with the use of cards, and the usual mode of designing for figured weaving.

2600. William Henry Myers, of Whitechapel-road. An improved means for signals on railways, being a system of signals for railway trains in motion or otherwise, comprising communications between guards and engine-drivers, station-masters, and others, the same apparatus being applicable as fog, danger, and accident signals, the same apparatus being also a communication from station-masters or their servants, including point and signal men, to guards and engine-drivers, for passengers, by means of glass or metallic pendant signals.

2601. Robert Porter, of Blackburn, joiner, and James Porter, of the same place, cabinet-maker. Improvements in machinery for the manufacture of bricks.

2602. Richard Usher, of Rath Boro, Wexford. A machine for imparting motive power to threshing-machines and such like agricultural implements.;

2603. Henry Edwards, of Dalston, gentleman. An improved vessel or feeder for administering food and medicines.

2604. Frederick Mortimer Butler, of New York. Improvements in ventilators or wind guards for chimneys and other purposes.

Dated October 12, 1857.

2605. Franklin Prestage, of Westbury, Wilts, civil engineer. Improvements in the furnaces of locomotive and other steam boilers.

2606. John Gray, medical doctor, and John Wilson Gray, both of Rathgar, Dublin. An improved means of causing signals to be made on railways, and of otherwise preventing certain classes of accidents on same.

2607. George Beard, of Pall-mall, gentleman. Improvements in mechanism for producing impressions on paper or other surfaces.

2608. Vincent Wanostrocht, of St. Swithin's-lane. Improvements in converting muskets and other fire-arms into rifled fire-arms. A communication from Messrs. Minié and Delvigne.

2609. William Calvert, of Residentiary Houses, St. Paul's, clerk. Improvements in obtaining motive power by the action of the wind.

Dated October 13, 1857.

2611. William Edward Newton, of Chancery-lane. Improved apparatus for roasting or torrefying coffee or other substances. A communication from J. M. Gauthier, of Paris.

2613. Michael Henry, of Fleet-street. Improvements in apparatus for playing loto. A communication from P. E. Lemercier and J. F. Bouneau.

2617. John Harwood Simpson, of Petersham, Surrey, engineer. Improved machinery or apparatus for making bands or ropes of straw, hay, or other fibrous substances.

2619. Vincent Wanostrocht, of St. Swithin's-lane. Improvements in obtaining fatty and oily matters by distillation. A communication.

2621. William Sharman, of Sheffield. An improved metallic compound applicable to the manufacture of various useful and ornamental articles.

Dated October 14, 1857.

2623. Edward Keighley, of Bradford, York, dyer. Improvement in the preparation and use of dye liquids.

2625. John Field Swinburn, of Birmingham, gun-maker. Improvements in fire-arms. A communication from T. Bailey, of New Orleans.

2627. Edward Owen, of Blackheath, chemist. Improvements in the preparation and manufacture of manures.

2629. John Middleton, of Hyde, Chester, ironmonger, and William Rylance, of Whitefield, near Manchester, manufacturing chemist. The application of a certain metal or material to the manufacture of shuttles, bobbins, and tubes.

2631. Joseph Parker, of Southampton, joiner. An improved method of fitting and working Venetian and other similar blinds used as ventilators or screens, or both.

2633. Godfrey Rhodes, of Dublin, captain 94th foot. A parabolical or bell-shaped or other shaped camp or field tent, without any centre support or pole.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," October* 27, 1857.)

1649. G. Davies. Improved apparatus for weighing grain and other articles, to be called the Electro-magnetic Grain Scale. A communication.

1668. C. Vero and J. Everitt. Improvements in the manufacture of hats and other coverings for the head, and in machinery or apparatus to be employed in the said manufacture.

1675. W. Young. Improvements in lamps and burners.

1685. G. T. Bousfield. Improvements in the construction of wheels and axle boxes. A communication.

1687. W. B. De Blaquiere. Improvements in connecting the ends of submarine electric telegraph cables.

1702. T. L. Ralph and T. L. Ralph, Jun. An improvement or improvements in the manufacture of metallic tubes.

1706. J. E. Barton. An improvement in winding worsted on to creel bobbins of carpet looms.

1710. S. T. M. Sorel. New chemical compositions, producing either house paintings, cement, or plastic paste to be moulded.

1719. W. E. Newton. Improvements in the construction of railway crossings. A communication.

1724. S. Fox. Improvements in fly-presses.

1726. S. Fox. Improvements in the manufacture of umbrellas and parasols.

1732. W. R. Lomax. Improvements in governors and pressure gauges.

1733. T. F. Caldicott. Improvements in planes. A communication.

1734. L. Cowell. An improved machine for teaching the art of swimming.

1736. J. G. Lynde. Improved means for detecting and preventing the waste of water in cisterns.

1738. G. W. La Baw. Operating the sails of vessels from the deck by means of vertical shafts.

1741. J. Norris, Jun. and G. Worstenholm. Improvements in machinery for making nails, bolts, spikes, screws, rivets, and screw blanks.

1747. T. C. Bridgman. Improvements in the construction of screens, riddles, or sieves.

1748. W. Symons. Improved means of communication between the passengers and guards of railway trains.

1752. D. Evans. Improvements in locomotive and other furnaces, and in heating water to be supplied to steam boilers.

1759. R. Morcom. Improvements in dressing ores.

1764. G. Ireland. Improvements in raising weights applicable to stamping or cutting metals and other similar purposes.

1768. C. Sanderson. Improvements in the manufacture of railway bars, girders, and other articles requiring great strength and stiffness to resist pressure, concussion, or strain.

1779. W. Green. The letter announcer.

1788. J. L. Hancock. Improvements in means or apparatus for washing or cleansing.

1789. W. P. Struvé. Improvements in miners' safety lamps.

1794. R. Hattersley. Improvements in machinery for distributing and setting-up or composing type.

1799. F. Watkins. Improvements in the manufacture of screw nuts. A communication.

1811. J. Carter and B. Hodgson. Improvements in weaving carpets and other fabrics.

1812. W. E. Newton. Improved machinery for grinding the teeth of card cylinders. A communication.

1825. T. Hardcastle. A machine for doubling, winding, plaiting, and measuring cotton and other fabrics.

1852. J. B. Meeus. An improved method of multiplying motive power and transmitting it to a shaft or other mechanism.

2181. R. Talbot and B. Broasdale. Improvements in looms.

2286. G. H. Cottam and H. R. Cottam. Improvements in the manufacture of children's cots and metallic bedsteads.

2294. T. Gray and G. J. Gladstone. Improvements in apparatus for lowering and letting go ships' boats.

2368. W. P. McCallum. Improvements in machinery used for stamping or raising metals.

2377. I. C. Clöet. Machinery or apparatus for treating and dressing rice.

2413. H. Greaves. Improvements in constructing the permanent ways of railways.

2486. M. Henry. Improvements in the manufacture of artificial wine, vinegar, and brandy, part of which improvements is applicable in the manufacture of brandy generally. A communication.

2558. J. Parker. Certain new and useful improvements in machinery for grinding card cylinders of carding engines.

2561. C. W. Finzel and J. Bryant. Improvements in cleansing animal charcoal, and in removing iron and other impurities therefrom.

2564. W. Knapton. Improvements in gasometers or gas-holders, and in the application thereof to railway and other carriages and ships, for lighting the same with gas.

2569. W. Gossage. Improvements in the manufacture of sulphuric acid.

2574. T. Grubb. An improved photographic lens.

2594. C. Barnard and J. Bishop. An improved washing machine.

2623. E. Keighley. Improvements in the preparation and use of dye liquids.

2627. E. Owen. Improvements in the preparation and manufacture of manures.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2256. John Maddox, Edward Gardner, and George Dyer Green.
2266. Joseph Hopkinson, Jun.
2272. Richard Roberts.
2275. Colin Mather.
2282. John Healey, John Foster, and John Lowe.
2297. Edward Lindner.
2452. Richard Keefe.

LIST OF SEALED PATENTS.

Sealed October 23, 1857.

1143. Matthew Dunnett.
1145. David Milnes.
1149. Jaques Richard.
1153. William Colborne Cambridge.
1159. Edward Manico.
1171. James Simpson and Edwin Rimmer.
1188. William Levesley.
1200. David Chadwick and Herbert Frost.
1202. Charles Pascall.
1208. Joseph Bottomley, Christopher Hodson, and William Fielden.
1231. John Henry Johnson.
1249. Tertius John Cooke.
1252. John Stanley.
1266. Robert William Sievier.
1279. Arthur Kinder.
1311. William Player Miles.
1440. Meyer Drukker.
1611. Peter Armand le Comte de Fontainemoreau.
1841. Marguerite Antoinette Laurent.
2059. Jules Dortet and André Barthelemy Denis.
2229. George Steell and William Steell.

Sealed October 27, 1857.

1181. Polydore De Keyser.
1183. Edmund F. Barnes.
1185. John Macintosh.
1190. Heinrich Hochstaetter.
1198. John Ramsbottom and John Bailey.
1213. Henry Ball.
1218. Samuel Mortimer.
1221. George Powers.
1225. John Collins.
1229. Edward Hawkes.
1232. Alfred A. Blandy.
1233. Richard Leake and Matthew Sykes.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Dates of Registration.	Nos. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
Sept. 24	4022	G. G. A. L. M. Schelhorn	Birmingham	Penholder.
,,	4023	J. O. Williams	Torquay	Recoil wind-guard.
,,	4024	J. Smith and Co.	Long Acre	Folding pattern card.
Oct. 1	4025	C. L. and C. E. Laseque	Judd-street	United pouch, pipe case.
,,	4026	A. Straker and Son	Monkwell-street	Music wrapper.
16	4027	Dain, Watts, & Manton	Birmingham	Buckle.

PROVISIONAL REGISTRATIONS.

Sept. 29	930	C. E. Douglas	Brighton	School inkstand dish.
Oct. 6	931	J. Stranders	Stoke Newington	Pepper castor.
9	932	R. H. Davidson	Hoxton	Glue holder.
13	933	J. Underwood	Birmingham	Porte-monnaie.

NOTICES TO CORRESPONDENTS.

Mr. Atherton's letter, and our reply, occupy so much space in this Number, that we are reluctantly compelled to defer the publication of several letters, including "C. W. M.'s" on "Scientific Discussion," Mr. Burcham's on "Circular Tillage," Mr. Moy's on "The Wave Line System," Mr. Cheverton's on "Submarine Telegraph Cables," and Mr. Holland's on the "Decimal System." We have also received a long letter from "Nauticus," in which Mr. Armstrong's letter of last week is sharply criticised. If Mr. Green will put his views on the Iron Question in fewer words they shall be inserted.

We take this opportunity of guarding our correspondents against that improper discursiveness which renders some of their letters so difficult to deal with. We beg them, if they feel disposed to write upon two or more separate subjects, to write a separate letter upon each. This will keep their discussions distinct, render their letters much more valuable to the reader, and improve their own habits of thought also.

Some of our friends probably think that too much space has been accorded to the discussion of the Tonnage and Shipping Registration Question. If so, we assure them that if we had not resolutely and unflinchingly kept the common sense (which is also the scientific) view of the subject as prominent as we have in our pages, the shipping interest would ere this have had imposed upon them—certainly would have been menaced with—some false and irritating legislation. Our duty in this case has been, and is, annoying and wearying; but if we failed in it, we should give an easy triumph to errors that must be repressed.

J. Clarkson says:—"Will you be so good as to give us a careful answer to the accompanying proposition. We ask this as a favour, and as some importance is attached to your solution, we trust you will give it due thought and consideration.—A railway train is supposed to be travelling at the uniform rate of a mile per minute. An individual standing on the train is supposed to fire from two pistols two bullets, one before, and the other behind the train. The pistols are supposed to be fired at the exact instant of time that the individual on the train is opposite a telegraph post, and the bullets are supposed to travel at exactly the same velocity as the train. Required to know the relative distances of the train, the two bullets, and the telegraph post, at the expiration of the minute."—J. Clarkson may rely upon the correctness of the following reply: The bullet fired behind the train will drop at the point where it leaves the pistol. The bullet fired ahead of the train will (if the resistance of the air be neglected) proceed at a velocity double that of the train, and at the end of the first minute will have travelled two miles from the telegraph-post alluded to. In practice, however, the bullet fired forward would not preserve the velocity with which it started; but, in consequence of the resistance offered by the atmosphere, its motion would be constantly retarded, and it would not, therefore, travel quite two miles in the first minute.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1787.] SATURDAY, NOVEMBER 7, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

ROBERTS'S PATENT PUMPS.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

ROBERTS'S PATENT PUMPS.

MR. W. ROBERTS has invented and patented, and Messrs. Brown, Lenox, and Co., of Millwall, are manufacturing, a new form of double-action pumps, which possess very marked advantages when compared with the best pumps previously existing, such as Downton's. The improved pumps have been brought to the notice of the Admiralty, and tested by officers appointed for the purpose, the result being highly satisfactory.

The experiments were made on board H. M. ship, *Fisgard*, at Woolwich, with a 7-inch Downton's three-throw pump, manufactured by J. Stone, of Deptford, and fitted in every respect like those usually fitted in the Navy, with two lead suctions leading into separate tanks of 400 gallons each, and one leather suction leading to the water outside; and with Mr. Roberts's 5½ ins. twin pump, which was fitted on the opposite side of the deck, and had the suctions arranged exactly the same as Downton's. In the preliminary trial, on October 10, 1857, Downton's, with six men, pumped two tanks out in 9 min. 20 seconds, and it took 40 seconds to shift the goose-neck. Roberts's, also with six men, pumped them out in 7min. 45 seconds, there being no occasion to stop during the time the communication was shifted, thus giving a result of 103¼ gallons per minute for Roberts's, and 80 gallons per minute for Downton's, or above 25 per cent. in favour of Roberts's. In the second trial (fresh men being put on) Roberts's filled the first tank in 4 mins., and Downton's in 8 mins. 10 seconds, and the second was filled by Roberts's in 4 mins. 20 seconds, and by Downton's in 6 mins. 35 seconds, giving upon the whole trial 96 gallons per minute to Roberts's, and 54½ gallons to Downton's, or nearly two to one in favour of Roberts's, as the two tanks were filled by his pump in 8 minutes 20 seconds, and one by Downton's in 8 minutes 10 seconds.

At the trial on Thursday the 15th ult., Charles Atherton, Esq., chief engineer, J. Peake, Esq., assistant master shipwright, Mr. Large, assistant master shipwright, Mr. Black, master smith, and other officers of Woolwich Yard and of the ship were present on behalf of the Government, Mr. Stone on behalf of Downton's pump, and Mr. Roberts on behalf of his own. The Downton's pump used at the former trial had been taken away, and a new one made by Mr. Stone for the occasion, having an enlarged delivery, also a double nozzle similar to Roberts's fitted to it to take larger hose pipes than are generally used; in short, a nozzle fit for a 9-inch pump was put on a 7-inch pump in the first experiment. Downton's pump, having the nozzle removed to give as large a delivery as possible, with 4 men, was 5 minutes emptying the first tank, 1 minute shifting the suction, and 5 minutes 5 seconds emptying the second, being 10 minutes 5 seconds the two, or 67¾ gallons per minute; and Roberts's with 4 men emptied the first tank in 4 minutes 30 seconds, and the second in 3 minutes, being 7 minutes 30 seconds the two, or 106¾ gallons per minute, there being no stoppage to shift the suction, and no alteration made in the pump at all. The next experiments were to fill the tanks; in these, with 4 men to each pump, Downton's filled each tank in 5 minutes, and Roberts's in 4 minutes, being 25 per cent. in favour of Roberts's. The next experiments were to try how near the actual quantity of water thrown came to the theoretical quantity. Downton's pump, with 6 men, emptied the tank in 4 minutes 45 seconds with 298 revolutions, being at the rate of 84¼ gallons per minute, being a loss of 20 per cent., and Roberts's, with 6 men, did the same work in 3 minutes 30 seconds with 203 revolutions, being 114¼ gallons per minute, being a loss of 4 per cent. only, against 20 by Downton's, and 37 per cent. in favour of Roberts's in pumping out. The next trial was to see what time would be required to take them to pieces and put them together again in case of anything going wrong with the lower valves of Roberts's pump or the lower bucket of Downton's. This trial was commenced at 11 hours 18 minutes, the air chamber was taken off Roberts's, the valves taken out, replaced again, and the water fetched at 11 hours, 19 minutes, 30 seconds, or in 1½ minutes. The hose was then screwed on and led to the upper deck, and the water thrown from a ¾-inch jet up to the topsail yard, a height of 68½ feet, within 4 minutes of commencing to take it to pieces, 6 men being at the handles. Downton's, in consequence of a hitch in putting it together, was full 20 minutes before it was in working condition; then with 6 men on the handles, and the same branch and jet pipe as was used with Roberts's, it only threw the water up to the top at first, and it then gradually lowered to the level of the foreyard.

It now being considered by the committee, and assented to by Mr. Stone, that all that could be done with Downton's had been done, some further experiments were tried with Roberts's to test its capability and power as a floating engine. The ship's pinnace was hauled alongside, the pump unbolted from the deck, disconnected from the suctions, placed in the boat, longer handles applied, and the hose screwed on; it was, within the space of a ¼ of an hour from the time of starting, in full play, throwing the water a considerable distance, and, when pointed to the ship, threw it over the topsail yard, a height of 83 feet,

striking the lower yard with considerable force. The men were then called alongside, the pump returned to its place, and refixed ready for work in 10 minutes.

Mr. Roberts's pumps have also, it is considered, the following advantages:—1st. It is equal to two double action or four ordinary pumps, having but one set of four valves, and it occupies scarcely any more space than one ordinary pump. 2nd. The valves being placed in a chamber between the cylinders, in pairs immediately over each other, they are not likely to choke or foul, and being covered by the air chamber, nothing can get in from the top to injure it. The cylinders, valve, and suction chambers being cast in one piece, there are no joints to get out of order. 3rd. The air chamber being secured by a single bolt, it can be removed, and the valves taken out and replaced in a very few minutes without disturbing the cylinders or pistons, and, from their simplicity, a carpenter could make and fix a temporary set of valves from a piece of board with some canvas or leather in half an hour. 4th. Having four or more suctions, communication can be made with the different compartments, or instantly shifted from one to the other, without stopping the pump at all, and in ships not having watertight bulkheads, the bilge pipes could be connected with the main pump, doing away with the bilge pumps entirely. 5th. Being a powerful force pump, and having a suction pipe communicating with the water outside, it can be used as a fire engine, or for washing decks, wetting sails, &c., or for any of the purposes for which a force pump is required. 6th. By placing the plug in the suction plate so that the port is half over the sea suction, and half over one leading to the hold, it becomes a syphon, and any quantity of water can be run in without pumping at all. 7th. It can be removed from its place and fixed in a boat so as to be used as a floating engine in about a quarter of an hour. It can be fitted as a portable general pump, and is equally applicable to land purposes, fire engines, &c., and can be worked by hand, steam, or horse power.

Several ships have been fitted with the improved pumps; among others, the *Undine*, belonging to the Marquis of Stafford, and the *Vulcan* and *Pluto* of the Austrian Lloyds.

The engravings on page 433 illustrate the invention. Fig. 1 is a side view of a hand pump; fig. 2, a transverse section of the same; fig. 3, a side view of a steam pump, and fig. 4, a side view of a portable pump, partly in section. In all the figures the same letters denote the same parts. A, A^1, are the cylinders, and B, the valve box, in which is a partition, *b*, and four valves, b^1, b^2, b^3, b^4. C, the suction chamber, having 4 suction pipes, c^1, c^2, c^3, c^4, and the plug, E, in the centre. The cylinders, valve box, and suction chambers are in one casting. The operation is as follows: as the piston in the cylinder, A, ascends, the valve, b^1, opens, and the water ascending the pipe, *c*, passes by the passage, a^1, to the underside of the piston, at the same time the water is expelled from the top of the cylinder, A, and passes away by the passage, a^2, through the valve, b^2, and the force pipe, D. In the other cylinder, A^1, during this period the water passes by the passage, a^3, (whose opening into the valve box is opposite to that of the passage a^1), to the space above the pistons, and from under the piston the water escapes by a passage, a^4, which opens into the valve box, at a point opposite to the mouth of the passage, a^2, and passing through the valve, b^2, it passes together with the water from the other cylinder through the force pipe, D. When the motion of the pistons is reversed, the valves, b^1, b^2, close, and the valves, b^3, and b^4 open, the one to allow the water to pass from the suction pipe by the passage, a^2, to the space over the piston in the cylinder, A, and by the passage, a^4, to the space under the piston in the cylinder, A^1, whilst at the same time the other valves and passages allow the water expelled from the cylinders to escape by the force pipe, D.

To shift the communication, the plug, E, is turned, so that the port in the plug is opposite the port in the suction chamber; this is known by the two marks forming a complete broad arrow. The suction plate is a modification of the suction chamber already described, and is intended to be used with any ordinary pump.

THE "LEVIATHAN," *alias* THE "GREAT EASTERN."

THE launch of this remarkable ship was attempted on Tuesday last, Nov. 3, without success. After having been christened the *Leviathan*, hauling-off cables worked from lighters in the river, and by steam engines on shore, were first put in action, and when these were found not to move her, a pair of powerful steam-driven hydraulic machines were set to work against the shore sides of the two cradles. These in a short time put the ship in motion when it was unhappily found that of the huge check cables employed, the after one had been allowed, by some fearful oversight or other, to remain slack, and the stern of the ship was consequently without restraint. The results which might have followed from this neglect are too awful to contemplate; but, fortunately, the breaks were successfully applied as soon as the cable was put in tension, and before the ship acquired any uncontrollable momentum. The five or six

workmen were, however, seriously, and some of them it is feared fatally, injured. The ship was found to have moved about 3 feet forward, and 5 feet 6 inches aft. On attempting a second time to put her in motion, one of the steam engines and one of the hauling-off cables gave way. No other attempts will be made until the 2nd of December next.

INSTITUTION OF ENGINEERS IN SCOTLAND.

The first meeting of the session of this newly-formed scientific association was held in the Philosophical Society's Hall, George-street, Oct. 28, Professor Rankine, the president, in the chair.

Mr. Hunt, the secretary, read the minutes of a meeting held in June, and announced the names of eight influential gentlemen proposed as members, to be ballotted for at the next meeting.

The president then proceeded to deliver an inaugural speech, in the course of which he said, the institution traced its origin to the meeting of the Society of Mechanical Engineers held last year in Glasgow, it being considered by the promoters that a Society of Engineers holding its meetings in Scotland—and in Glasgow as the best mechanical centre—would be successful, and highly advantageous. It combined mechanical and civil engineering, as both branches (unlike formerly) were now closely united since the extensive and increasing use of iron in building operations. The means of promoting the society's object, the advancement of engineering and practical mechanics, lay in experiments; and as few engineers had sufficient time for this at their disposal, the institution would prove useful, and enable them to record for the benefit of others whatever discoveries they might incidentally make in the pursuit of their business. The learned Professor having commented upon the great importance of the advantage to be gained from the new institution, went on to say that the present period was a most favourable time for the development of science and the progress of such a society; for reckless speculation no longer existed, and engineers were disposed to conduct their operations with an economy that called forth all their skill—an economy that endeavoured to accomplish an end by means just sufficient to do so in the most scientific and serviceable manner, and no more. He then pointed out some of the more important subjects on which knowledge was required. One of the principal of these was that of materials. The interesting question arose, "Can iron produced in our own country be improved so as to remove the materials that deteriorate its strength?" (Hear, hear.) That was an important matter on which the society would afford the means of throwing light by collecting the experiences of its members. There were other materials of importance, timber for instance, the seasoning and preserving of which deserved attention. The hardening of stones, the manufacturing of artificial stones, the strength of bricks, and the laws on which the transverse strength of beams could be based, were also matters requiring investigation. Then there was the stiffening of suspension bridges—a subject that attracted great interest. That description of bridge was the strongest, but it was not well applicable to railway purposes on account of the vibration, which would be so great on the transit of a train at high speed as to endanger the stability of the structure. In reference to this subject, Mr. Peter Barlow made experiments on models and found that very light girders, in comparison to what had been generally supposed to be necessary, were quite sufficient to stiffen a suspension bridge—that, in fact, girders of a certain stiffness would sustain 25 times the weight that produced a deflexion without the suspension chains. But these experiments were made only on models, and the result remained to be tried upon a large scale, and the matter was well worthy the attention of engineers. Professor Rankine, after some remarks of a technical character, alluded to the deviation from old rules adopted by Messrs. Brunel and Scott Russell in the building of the Great Eastern, and said that a change was required in the plan on which iron ships were now built. They were always built on the plan of wooden vessels, the builders never taking into account that they were dealing with a different material from that to which they had been so long accustomed. Having mentioned the steam engine, the electro-magnetic engine (which he said was clean, manageable, and adapted for neat workmanship, although more expensive than the other), he touched upon the wide field for improvement in the railroad, and alluded to some other topics of interests to engineers. He referred to sanitary engineering, such as drainage, ventilation, water supply, ventilation of mines, and to the devising of some means to increase the illuminating power of gas, so as to diminish its cost. On the importance of accurate workmanship he need say nothing in a city like Glasgow, where there were so many skilful artizans. The reformation of the present system of measures—especially those of length—was a subject which the society should use their best efforts to secure.

It would be for the Institute to endeavour to promote a unity of opinion on this subject, which would be the only means of obtaining the necessary change at the hands of Government. The last topic on which he would touch was legislation as it affected engineers. First of all, there were the patent laws, which required improvement. They had been partially amended, but both the laws and their administration needed further alteration. There was another class of legislation, then, to which an institution of engineers should turn their attention—laws concerning the public safety—laws to regulate the strength of boilers and the speed of railway trains. There were no laws enacted in reference to either of these matters; but if such laws were provided, they should not be calculated to check enterprise or restrict or inconvenience inventors or manufacturers more than was necessary; and in order that the Legislature might be accurately informed of the circumstances that should guide them on subjects of the kind, it was of the utmost importance that these subjects should be publicly discussed at meetings by practical and scientific men. He was sorry to perceive a disposition on the part of some very eminent persons to recommend restrictions that he should think very injurious. For instance, Lord Brougham suggested that the speed of trains should be limited to 25 or 30 miles an hour. Now, under proper management and with care, a speed of 70 miles an hour could be made with as much safety as 17, for accidents seldom occurred but through mismanagement; and the proper course to adopt would be to enforce proper management and caution. The speaker, in conclusion, said Glasgow was a city that possessed the manufactures of Manchester, the shipping of Liverpool, the hardware of Birmingham, and the coal of Newcastle; and considering the vast extent and the great perfection to which some branches of its practical mechanics had arrived — especially its skilful iron ship building and engine making — it could fairly be called the "metropolis of mechanics." Professor Rankine resumed his seat amid much applause.

The Chairman then made some observations on Whitworth's decimal system as applied to divisions and gauges. Mr. Whitworth's proposal takes the inch as the unit. This was objected to by the majority of the meeting as being not sufficiently comprehensive. After some discussion, it was suggested that the aid of the English scientific societies be requested towards petitioning Parliament to hasten and facilitate the reform sought.

A paper was then read on M. Beaufumé's gas-flame furnace.

POCKET FILTER FOR TROOPS AND TRAVELLERS.

The patent porous stone of Mr. Frederick Ransome has been applied in the construction of a pocket filter which will be of the utmost value to troops and travellers. It consists of a small cylinder of stone attached to a disc of wood on which is fitted a short vulcanized india-rubber tube, furnished with a mouthpiece. By placing the stone cylinder in any foul water whatever which may be met with, and drawing with the mouth through the mouthpiece and tube, a draught of clear pure water may be obtained, the water being perfectly filtered in its passage through the stone. The article is manufactured and sold for a very small sum.

The annexed engraving represents the filter. A is the stone cylinder, B the disc

D

of wood, C the India-rubber tube, D the mouthpiece.

The Bridge in St. James's Park.—A correspondent of ours, in a former number, called attention to the unfitness of this bridge for the park. In its last number the *Athenæum* says: "The new suspension bridge over the water in St. James's-park was thrown open on Sunday last. A more strange and hideous specimen of construction could hardly be devised. What is the benefit of schools of art being established, when Government itself sanctions so much ugliness, neglecting a marked opportunity of combining graceful forms with strictly utilitarian purposes? Public convenience gains by this direct road from Queen-square, Westminster, to Marlborough House courtyard; but its taste might have been gratified also."

THE WAVE LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

Gentlemen,—It appears quite clear that your correspondents, Messrs. Cheverton and Armstrong have not considered my British Association paper to be worth their study, or they would have been less eager to fill your columns with their own opinions. That paper is the result of very much thought, as the very first sentence tells them, and I would advise them to be less ready with their pens to accuse persons whom they have never seen of mental incapacity and wilful falsehood, and to be more ready with their brains to consider whether a new idea has not been started which will upset all former modes of calculation on the subject.

Believing that my paper, as originally written, would, on publication, be very seriously curtailed, I reduced it as much as possible, and fully expected that those who thought the subject worth their notice would not only be willing to work out every idea more in detail, but, if they knew my conclusions to be wrong, would assign to each vessel mentioned the actual speed she would attain with the power I have given to each.

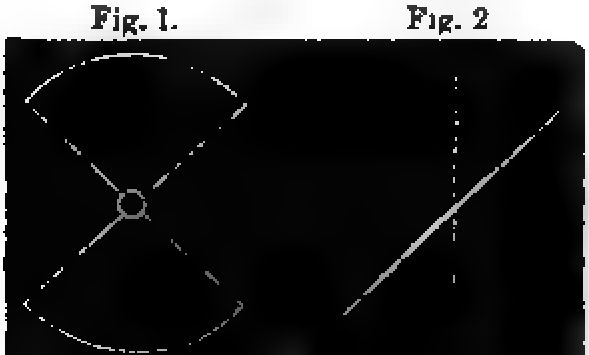
I must therefore trouble you with this rather long communication, begging you will insert the whole of it, and I think the importance of the subject will be a sufficient excuse for its length.

When a vessel is built with a hollow water line forward, however slight the hollow, and however obtuse the angle at the stem, the conclusion is immediately jumped at, that she is on the wave line system; but in most cases it is a mere attempt by a constructor who is not aware of the value of the wave line in its integrity.

The effect of the blade of a screw propeller upon the water, in travelling round its axis, is to drive the water in a direction at right angles to its motion, the result being a certain per centage of *slip*, and of *thrust* of the shaft. The effect of the onward motion of a well built vessel on the wave line system upon the water is also to drive the water in directions perpendicular to its line of motion, the result only differing from the screw in its being *all slip.*

If a screw composed of portions of a perfect

Fig. 1. Fig. 2



screw, as in fig. 1, could drive a vessel without slip, that form would be the proper one, (fig. 2 shows the edge of fig. 1, extended on a plane). Suppose, however, the same

screw ... per cent, then fig. 3 would be a better form

Fig. 5.

for the propeller, giving more effect, and working perfectly in the water with that

a pin and wheel being operated upon by the slot while the frame travels to and fro in the directions of the two arrows. The total amount of curvature (from *a* to *b*) represents the *stroke* of the body to be moved, and the length of the curve (from *a* to *d*) represents the *stroke* of the driving power. If from *a* to *d* equals 10 feet, and 3,300 lbs. be required to produce one stroke of 10 feet per minute, this will equal 1 horse power. Alter *a* to *d* to 20 feet, then 1,650 lbs. would be sufficient, and 1,650 × 20 feet per minute would again equal 1 horse power. This curve is the wave curve, and I maintain that no better form can be found for fast going vessels, and that the larger the vessel is the more necessary is this curve.

And now as to water in motion. It is not very difficult to find a steam vessel that will travel 10 miles an hour, and let fig. 5 represent the entrance lines of such a vessel on this system. I have divided these lines into ten equal parts, each imparting motion to, and sustaining the pressure of, an equal portion of water 10 feet wide; the bow being 100 feet long, beam 40 feet, horse power 200. The vessel moves forward 880 feet per minute; each of these twenty portions, therefore, requires 10 horses power to drive it 20 feet, at a speed of 2 miles an hour. And I have some reason to think that to drive them at 4 miles an hour would require 40 horses power each, or 800 altogether, as I stated in my paper. And to do this the vessel must, of course, travel forward at 1,760 feet per minute.

But if I can so form another vessel that it shall travel 1760 feet per minute *without increasing the speed of each of these portions of water beyond the* 880 *feet per minute, the required horse power will only have to be doubled.* For this purpose, suppose the bow, fig. 5, to be 200 feet long, the beam remaining as before, 40 feet. There will then be 40 portions of water 10 feet wide to be operated upon at a speed of 2 miles an hour. Not one atom of water is accelerated in its motion in this case; there is no need to square the power; the only difference is that the number of portions is doubled in amount, and therefore this boat requires double the power, and unless the vessel travels 1,760 feet per minute, or 20 miles an hour, she cannot use her full power; any diminution in her speed would reduce the speed of these portions of water to less than 2 miles an hour.

But suppose I place in the vessel with 200 feet bow only 100 horse power instead of 400, she will travel at the same rate as the other vessel with 200 horse power, according to the square theory; for each of her 40 portions of water will only have to move at the rate of 440 feet per minute, or 1 mile an hour, and therefore will require only 2½ horse power each instead of 10; and if both vessels travel a certain voyage at the same speed, the larger one will consume just half the quantity of coals that the smaller one consumes. And this coincides with the remarkable case of the *Hudson* and *Troy*, for if the *Hudson* had had the same midship section as the *Troy*, and had also been double the length of that vessel, the *Hudson* would only have required 10 tons to the *Troy's* 20. For both vessels started and arrived together, from New York to Albany, and the *Hudson* used 13 tons while the *Troy* used 20. I am, Gentlemen, yours, &c.,

T. MOY.

1, Clifford's Inn, Oct. 27, 1857.

MONSTER GUNS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In the *Mechanics' Magazine* of August 22nd, in reviewing a little pamphlet of mine on gunnery, you say that Mr. Mallet has forestalled me in recommending guns to be made of concentric layers, so put together that, at the moment of firing, the greatest possible proportion of the thickness of metal shall be nearly equally strained. You had not remarked that it was the second edition of my pamphlet you had, the first having been printed for private circulation in June, 1855, and only published at the close of the war—for obvious reasons.

However, I wrote to Mr. Mallet, and also to Dr. Hart, of Trinity College, Dublin, who had made the calculations on which Mr. Mallet's theory is based, and from each I have received the same answer, viz., that they cannot say which of us was first, but that it is evident from the closeness of the dates that I cannot have borrowed from them. As I did my best to keep my discovery secret, of course they cannot have borrowed from me. Indeed, even if I am the first proposer of the plan, that can in no manner detract from the merit of Dr. Hart or Mr. Mallet; for as an artillery officer, my thoughts should have been directed to the subject. I trust, therefore, that the question of priority will not be raised, being totally unimportant.

Now, although Mr. Mallet and I so perfectly agree in stating the theory, I differ from him in applying it, and believe that the method he recommends in his book, viz., making the interior of the gun of staves accurately fitted, and shrinking or forcing on a series of concentric cylinders or hollow frustra of cones, would necessitate the use of three or four times the amount of metal which would suffice if the interior be made of one piece. I see that in his beautiful 36-inch mortars he has not used staves,

but wrought iron welded, which I trust he will find efficient, though past experience does not justify very sanguine expectations of the result.

Cast iron being perfectly adapted for the bore of a gun—lasting thousands of rounds without damage—*why* use another and more expensive material? I was told two years ago by the select committee that a cast-iron centre and wrought iron exterior would not work together; but a gun of mine, which was tried at Woolwich and Shoeburyness against two others, showed a degree of strength to which that of the others bears no comparison. The guns tried were—

A 9-pounder of wrought-iron (Mr. Dundas's), weight 18 cwt.

A service 9-pounder of cast-iron, weight 17 cwt.

A service 9-pounder of brass, weight 13½ cwt.

A 9-pounder on my principle, weight 17½ cwt.

As proof, two rounds were fired from each 8 lbs. of powder, 1 shot, 1 wad.

Then, for comparative trial—

86 rounds,	3 lbs. powder,	1 shot,	0 wad.
26 „	4 „ „	1 „	0 „
5 „	5 „ „	1 „	1 „
5 „	5 „ „	2 „	1 „
3 „	6 „ „	2 „	1 „

At this stage of the experiment Mr. Dundas's gun burst; the cast-iron gun was fired 107 rounds additional with the last charge of 6 lbs., 2 shot, 1 wad; it then burst; the brass gun was fired 171 rounds more than Mr. Dundas's with the same charge; when it was found unserviceable from bulging at the muzzle. Mine was fired 305 rounds more than Mr. Dundas's, or 134 rounds more than the brass gun; but as it even then showed no signs of wear (except requiring a new touch-hole), they increased the charge by one shot at a time *till it was loaded to the muzzle, and it stood* 158 *rounds thus loaded!!!* I am told that the reasons for not immediately adopting my plan are that *such great strength is not required*, and that by waiting *something stronger may be found out*. I assure you, gentlemen, that both of these reasons were alleged to me by the same official.

As for great strength not being required, I acknowledge that for 24 or 32-pounders, for ordinary service, cast-iron is strong and light enough; but a few 24-pounders, weighing only 6 cwt. each, would have given us Delhi months ago, and a few very light 12-pounders would have enabled Havelock to relieve Lucknow.

Again, in monster guns the strain is much greater in proportion than in smaller ones. I trust Mr. Mallet has well considered this—for gunpowder requires about $\frac{1}{100}$ths of a second to burn, at the end of which period the strain is greater as the ratio of the distance the shot has moved to the length of the cartridge is greater; for instance, in a musket the bullet in $\frac{1}{100}$ second has moved about 30 inches, and if the cartridge was 1 inch long, the powder has 31 times its size as a solid to expand in.

Now in the same time ($\frac{1}{100}$ second) a 30-inch shot would not have moved 1 inch, and the gas of the powder would be confined in little more than its original bulk, and the pressure would be at least 25 times as great as in a musket, or fully 3,000 atmospheres, or about 20 tons to the square inch. Nor is this all, for evidently the larger the gun, the *longer* must the great pressure last.

These are difficulties not to be overlooked by the advocates of monster guns; they can be overcome, but not by cast-iron. Indeed, we know by experience that a 32-pounder is the largest safe cast-iron gun. A 68-pounder is always fired with a reduced charge, and is objected to in the navy, because it bursts if double-shotted. Apologizing for the length at which I have entered into the subject,

I am, Gentlemen, yours, &c.,

T. A. Blakely.

CIRCULAR STEAM TILLAGE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—In a former letter I stated that I knew how to till land by the aid of steam, and, if assisted by a capitalist or engineer, could construct a machine which should hoe or sow an acre of land in five minutes of time, &c. Moreover, I could double to himself and his employer the working value of "man," the labourer. It remains for me to explain how and why it should be done.

I will be as concise as possible on a subject which, in its very nature, is long; involving (as it ought) an examination of our present system of agriculture, before propounding a new one.

For years past, inventors have tried to gear steam on to our present field-practice. To accomplish it, they have spared neither money, time, nor mechanism, yet have not succeeded, and they have tried everything except "method." Now it is on a change in the method of field-practice, and in the use of a special mechanism in a new form of tillage machine, that I depend for success.

Farming consists of three parts or divisions—in fact, is three arts. The first part is that of the field; this is the "creation"

of the material. The second is that of the homestead; this is the "manufacture" of the material. The third part is the market; this is the sale of the material. With this latter we have nothing whatever to do—our investigation having reference only to the first and second parts.

It will at once be noticed there is no other business in England like farming, for it has to *create* its own material! The doctrine hitherto inculcated by all inventors and sanguine persons is, that if the farmer employs machinery—that is, inanimate mechanism—in the field, as is done in other arts, he must succeed in like manner. Here lies the fallacy—here creeps in the gross error; and a false theory leads to a false practice—a practice which "time" may prove to be injurious both to the farmer, his countrymen, and his country.

I say there is no analogy between the manufacture of a dead object and the creation of a living one. Yet this is the difference between the field and the factory. Hence the mechanism which may apply and be approved in the one case, is inapplicable in the other.

Our special subject is the "field;" and our duty is to enquire, What is the chief object of field-practice? I say, *to produce a fine plant:* others say, *to plough.*

On their theory, inventors go to work to construct a machine for ploughing, and that only, as though it would ensure a fine plant or abundant increase. They propose to construct a machine which may cost, probably, from £500 to £1,000, only to work about two months out of the twelve! Does this agree with the "economics" of machinery? Or are they aware that, although the farmer pays for a machine when it is engaged in production, the nation pays for it whenever it stands still or is idle?

Now they cannot show there is any absolute necessity for that laborious clod-making operation called "ploughing," provided there were no "weeds" or roots to be turned. I say, that eradication and pulverization is all that is needed; and hence if they had but a sufficient hoeing and gradually-abrading machine, the only condition of tillage—viz., the preparation of a clean and aërated seed-bed—could be attained.

The whole end and aim of tillage is the production of a fine live plant. This depends more on skill and attention than on anything else. "*Man" alone possesses these elements;* hence "man" is the chief mechanism to employ in this matter: and I am prepared to show that he can perform every labour of the field, provided we endow him with that strength which he does not, but which the steam engine does, possess.

On this theory I base a practice, and devise a steam-driven tillage machine, which shall enable a man to do the work of the field, instead of inventing one to do the work for him.

I may here point out that if I succeed in my plan, it fulfils an important social problem, viz., it will greatly widen the field of human employment, at the same time that it increases and cheapens production. Hitherto the rule has been that "man" shall come in as the "*consequence*" of mechanical contrivance; in this particular instance of plant-production, or tillage, he will come in as the "cause."

I beg now to submit to the readers of the *Mechanics' Magazine* a method and a machine by which it is possible to hoe or sow an acre of land in five minutes of time, &c.

It will be advisable to offer an outline of the plan and the machine first; discussing the principles upon which the two are founded afterwards.

It often requires an immense number of words to convey to the mind of another that which a few strokes of the pencil or graver will effect on the instant; therefore I beg to submit a sketch, giving the general character of my proposed machine and method. The machine is a platform-hollow tube or gallery; one end rests on a pivot at A, the other on broad wheels at C. The machine, when actuated by horse or steam power, operates as a lever of the second class; that is to say, the work to be done is between the power and the fulcrum. The engine, or mechanic power, may be situated either at A or D. The works which transmit power to till the land, or sow the seeds, or hoe the weeds, or irrigate, &c., are placed in the gallery at B, and are "men," or human mechanism.

The operations of the field are ever varying, therefore the machine is made to form a universal cultivator, and by slight changes may be adapted to every operation of the field; for example, to form it into a drill, to seed an acre of land in five minutes of time, the levers, seen over the side of the machine, in the above sketch, are changed for what I term "sowing

boards," each board being superintended by a man; the machine then appears as follows:

The proportion of seed falling to each man's duty on the half acre of land is very small; he pours it from a flask, or suitable contrivance, upon the board at E, from whence it proceeds by diverging channels to the highly pulverized soil, and the work is done exactly like the present drill work.

The above is given as a sample of the adaptation of means to ends in this machine. The machine operates in and describes a circle. I divide a farm or a field into parts, half acres or whole acres; and the machine is to be made of such length or radius that it will strike a stroke over the assigned quantity of land at each revolution. We shall discuss the advantage or disadvantage of this subdivision of land into minute parts hereafter.

I need say little more in this letter, but sum up by saying, that in my proposed tillage machine, steam is the power—men are the works; or, to give it a distinctive appellation, it is a steam-man-power cultivator.

In my next I shall enter into mechanical detail, and show how the machine can be made to describe a circle by the power of a comparatively small steam engine, placed within the gallery.

I am, Gentlemen, yours, &c.,

CHAS. BURCHAM.

8, Upper John-street, Golden-square, W.C.

SCIENTIFIC DISCUSSION.

[The following letter is from a gentleman who is in every sense competent to administer the rebukes which it contains. *If* we could hope it would be well heeded by certain of our correspondents, the pleasure with which we insert it would be greatly augmented.]

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I beg leave to offer a few observations which may serve to improve the character of some of the discussions in your columns.

Mechanics are not the business of my life, and therefore I shall not take a side in the discussion on the forms of vessels. Looking at it, however, merely from an outside point of view, I have much fault to find with the turn which it has taken.

In so far as my experience of mathematical and physical investigations is concerned, I have always found that the one thing with which it was unsafe to dispense was the test of common sense; yet there is a large class of men who, when they get hold of forms or formulæ, seem to think that these will render the exercise of the faculty needless.

In the case before us, one gentleman draws a double set of trochoids, and, finding that, the longer they are, the finer the point to which they can be drawn, proceeds to set down that it is an "old world fallacy" to build a cutter sharp, and a three-decker bluff bowed. Now, I have never seen a cutter much sharper than Mr. Moy's bluffest lines, and, with regard to three-deckers, I may be allowed to suggest, that they have to carry an armament, including bow-chasers, and therefore want some buoyancy forward, as well as elsewhere. Imagine a floating battery, with a bow like the thin end of nothing!

I next find one of his opponents stating that, "no alteration of form of a vessel will enable us to obtain additional speed without additional power," unless in a case which he shows to be impossible. Does Mr. Cheverton think that any practical man would care to finish the perusal of his letter after meeting with such an assertion?

It is true, that Mr. Cheverton, in a subsequent letter, tries to explain away this statement; but, after reading his reply very carefully, I can only say that, "I wish he would explain his explanation," and that people who write in English must expect to find English words interpreted according to their true English meaning; and not in any non-natural sense which they themselves may *afterwards* choose to attribute to them.

I next find Mr. Armstrong, in a letter pretending to considerable mathematical exactness, and making free use of formulæ, and of Sir Isaac Newton's name, producing a formula *to supply a desideratum, and to exhibit fallacies.* He proceeds to show, from this precious formula, that Her Majesty's Yacht *Fairy* has absolutely 4 per cent. less speed, than she would have had, if she had been shaped with a square bow! Why, what better proof can a man want of the existence of an error in his formula than a result of this nature? Has Mr. Armstrong ever heard of a species of proof called *Reductio ad absurdum?*

I do not desire to throw a wet blanket on

the discussion, still less on the exact investigation, of these and similar questions; but it seems high time to remind some of the disputants that their communications must be more carefully weighed and sifted, if their opinions are to carry any weight, or even to be taken into consideration by practical men.

I am, Gentlemen, yours, &c.,

C. W. M.

London, Oct. 26, 1857.

SUBMARINE TELEGRAPH CABLES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—A statement has appeared in the papers that a patent has been taken out for 'rendering an electric telegraph cable temporarily buoyant whilst being laid, but that the means employed are not at present disclosed. The same idea occurred to my son immediately after the breaking of the Atlantic cable, and together with the mode of carrying it out, was unconditionally mentioned to so many persons, that I doubt whether an exclusive right for any similar plan could be maintained. In my first communication on this subject, animadverting on Captain Blakely's British Association paper, I alluded to the plan of counteracting the specific gravity of the cable by means of floats. Now, my son's idea was to make these floats of canvas rendered waterproof for a time by means of gelatine, or by common glue toughened with treacle; to inflate them with air only as they were wanted; and to attach them at intervals to the cable whilst descending into the water, immediately after passing the last pulley; and which could be done instantly by means of a very cheap and simple spring clipper. At the same time, I must observe that this plan provided for a mode of conducting the operation on a principle which he did not approve. To carry out the idea, there should be a machine on board, constructed, not for the purpose of retarding, but of delivering the cable at any desirable rate greater than that of the ship's speed, to be determined by the increasing depth to which the cable is descending, with an extra allowance for irregularities. There would also, according to Captain Blakely and the mathematicians of Section A of the British Association, be a further constant demand of cable, which, *mirabile dictu!* it would be a "mathematical impossibility" to avoid, inasmuch as the diagonal of a parallelogram is necessarily longer than either of the sides.

Besides the expense and trouble of acting on this principle of flotation, there would be the serious evil of exposing the cable for a longer time to the influence of currents, whilst the single advantage of preventing any strain on the cable could be secured by the much more simple expedient of increasing the speed of the vessel, and the yet greater velocity of the delivering machine, beyond the rate at which it would sink. What that rate with the present Atlantic cable would be, I do not know, because I am not aware what its specific gravity is; and if I had that datum, I would rather trust to an experimental determination of the velocity with which it would sink with different degrees of inclination than to any mathematical calculation on the subject; especially as I perceive that Captain Blakely, who has given particular attention to this point, has arrived at different conclusions, making at one time, in the case of a cable at an angle of 45 degs., of a specific gravity 5, and half an inch thick, the velocity to be 3¼ miles an hour, and at another time 2⅝ miles an hour. I believe that the *Agamemnon* or the *Niagara* could have steamed quite fast enough to have freed the cable from any strain at all, and to have required, indeed, the paying out machine to have hastened rather than have retarded its delivery; or else either its specific gravity, or its rate of sinking, is much greater than I imagine it to be.

It is important to observe, that with an increased speed of the vessel there is a diminished pull of the cable; so that one movement gains rapidly on the other—the progress on the sinking—*but it is vice versâ also;* and it was because the state of things was allowed to get into this latter predicament, and was attempted to be remedied by a severe application of the brake, instead of by an accelerated velocity of the vessel, that the disastrous issue of the late enterprise must be attributed. Assuming, then, that at an angle of 45 deg., the sinking of the cable does not proceed at a greater rate than 8 miles an hour, an ordinary steamer is quite competent to a velocity that will dispense with a brake altogether, and the principle of floatation cannot effect more. It only remains to ascertain whether the unwinding of the coil can be effected with safety at a little more than this velocity, and if any difficulty exists on that head, it is *there* where the exercise of inventive talent is required to be displayed, and surely it would have no arduous task.

I am, Gentlemen, yours, &c.,

BENJ. CHEVERTON.

MR. HOLLAND'S DECIMAL SYSTEM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In my letter to you, inserted 22nd August, I showed how near the bulk measures and weights of the "steen" system were to four times those of the French metrical system. I now propose to make them exactly four times. The consequence will be, that, like the French, we shall be obliged to use a coefficient to find the weight of a given bulk of water under ordinary circumstances of temperature and pressure, but this inconvenience will be more than compensated by the facility we shall acquire in turning French measures of bulk, and of weight, into English, and *vice versâ.*

At a temperature between 11° and 12° centigrade, the French platinum metre and our brass yard have this relation :—If we measure off a thousand sixteenths by this brass yard, then a cube whose side is equal to this thousand sixteenths will be exactly four times the size of a cube whose side is the metre ; or, in other words, at the temperature of about 11½° centigrade, a brass fathom of a thousand sixteenths, or "steens," will equal 1·587401052 French metres, and the French metre will equal 629·96052495 "steens." I propose to make a standard fathom as near as possible to the size named, and make a standard pound weight exactly equal to four hectogrammes. The gallon to be equal to 10 lbs. of water, and therefore exactly equal in bulk to four litres, and in weight to four kilogrammes.

By adopting the method here indicated, the "steen" will still be exactly the sixteenth of our present inch at a temperature nearer to the mean of England than 62° Fahr. is. We shall have a decimal system at least as perfect as the French, much more convenient, and place ourselves in unison with a great number of states as to weight. The toll pound used by all the states of Germany, for custom duties, will be exactly our new pound and a quarter. Austria, Prussia, Bavaria, Saxony, Hanover, Wurtemburg, and 22 of the smaller states of Germany have entered into a "currency treaty" by which 8,750,000 union dollars must be minted and put into circulation by December, 1862. These dollars are to be weighed by the toll pound, and would accord much better with the pound I propose ; 52½ of South German dollars are to be minted out of a toll pound of fine silver; this will give 105 to the kilogramme, and 42 to the proposed pound. The new land measure would be equal to 2·5198421 decares, and the hectare equal to 3·9685026 of the new land measures. Metres would be converted into the new lineal measures by multiplying by 63, or by 9 and then 7, or more accurately by 62·9960525. The Baden fuss would be 209·98684 steens.

Taking Professor Miller's value of the French kilogramme, viz., 15·432348744 grains, we shall have the following relations between the old weights and the proposed new ones. Old grain = 1·619974 new do. Old drachm = 0·9719843 new scruples. 9 Troy ounces = 6·998286 oz. new. Avoir. lb. = 1·133982 lb. new. Old cwt. = 127·006 lbs. new; ton = 2540·119 lbs. new. The sovereign would weigh 1·9970142 drams new. The Russian ruble would contain 4·4975 drams of fine silver, and therefore at 9/10 fine would weigh 4·99722 drams. The Russian imperial would be exactly three to the new ounce. I mention these particularly, because the English foot rule is very extensively used in Russia. The pound would be near the new pound, and the pipe almost identical with the new puncheon. The Russian maps and charts take Greenwich for Zero of longitude. These things considered, the Russians might be induced to join us in a decimal measure. So well is it adapted to Russia, that I do not believe it possible to frame a better system, even though England should not adopt it.

If we take the metrical measure of the earth as being correct, viz., ten million metres from pole to equator, we shall have a degree equal to 69·9956 miles new, the circumference = 25198·421, and the radius 4010·4533 miles. With a coinage based on a penny (the best basis) we should have 100*d.* piece of gold 9-10ths fine, 118 to the pound new, or, accurately, according to present value 117·9943.

Such is the system I commend to the favourable consideration of all those who take an interest in the decimal question of coinage. The only safe and easy way to introduce and carry out a decimal coinage, is to introduce it as part and parcel of an entire system of decimal measures of length, surface, bulk, weight, and value.

I am, Gentlemen, yours, &c.,

J. SIMON HOLLAND.

DANGER SIGNALS FOR RAILWAY PASSENGERS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The detonating fog signals now placed on the rails, when exploded by the wheel of the engine passing over them, make so loud a report that it is heard by the passengers throughout the train. I have made wooden or paper percussion grenades for house defence as far back as the year 1824. One of these, charged with the same composition that I charge my fog signals, equal parts by weight of chlorate of potass and sulphuret of antimony, thrown or dropped

out of the window of a railway carriage, or allowed to slide down through a tube or spout, being winged like a shuttlecock, would explode to a certainty on striking the ground, and make such a report as would be heard both by the guard of the train and driver of the engine. These signals take up but little room, and could safely be carried in a small box placed permanently within each carriage. Specimens of them are to be seen at the South Kensington Museum of Inventions. The box may be dispensed with, and the signal could be placed in the tube, with an iron pin under it, to support it till required to be used; when the instant drawing out of the pin allows the signal to slide down by its gravity; *two* signals may thus be placed one above the other, the lower pin to be first drawn out, and then the upper, if so required.

J. NORTON.

THE IRON QUESTION.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I cannot fully concur in the views of Σιδηρος on the iron question. He asserts that Martien appears to have originated the great discovery that pig iron can, whilst in the fluid state, be purified from carbon, silicon, and some other of its alloys, by forcing currents of air under it, so as to pass through and pervade its liquid particles. Yet he admits that Martien "overlooked the grand feature of his discovery;" or of that which he appears to have discovered, "and that Bessemer afterwards developed the principle to its fullest extent." Now the question arises, "did Martien understand the *principle* which Bessemer has developed?" Assuredly not, or he would have made better use of it in his provisional specification. As Σιδηρος says, "No man but Bessemer had ever dreamed that blowing cold air through melted iron, without the aid of additional fuel, would raise the temperature of that iron to a degree never before witnessed in metallurgical operations." But not only so; Bessemer not only had the genius to conceive, and the courage to test the correctness of this principle; he also had the wisdom to see that, whilst solid fuel was both destructive and expensive, there existed in common air elements of combustion which merely required to be brought into contact with the pernicious elements present in pig iron in the fluid state, such as carbon, sulphur, &c., in order to deflagrate and destroy themselves.

I think with Σιδηρος, that Bessemer's discovery will one day be "ranked not with, but above the great discoveries of Cort and Neilson;" but I deny that Mr. Bessemer, having taken the first step towards success, was unable to take the second. Indeed, this kind of logic is incomprehensible to me. The discovery must either be valuable or valueless; it cannot be both at the same time, as Σιδηρος assumes.

We are informed, however, that, though the labours of Martien, Bessemer, Captain Uchatius, and the Abbé Pauvert, are all chimerical and without commercial value, "an individual of the name of Mushet" has conquered every difficulty—has made those glorious strides which Bessemer was unable to take, and has produced commercial results in the shape of "sound and marketable bars" of steel, tin plates of extraordinary quality, "miners' tools," and "steel which welds and works as readily as the best double shear." Now, if Mushet has done this, I am glad of it; and hope the iron trade will appréciate and reward his labours without further delay. But I would advise Σιδηρος, before he again volunteers opinions as to the commercial value of the inventions of others to inquire a little further into facts. If he does this, he will see that Mr. Bessemer has made and can continue to make good marketable bars of steel with commercial as well as scientific success; and having taken a few steps beyond the first in what relates to steel, he, no doubt, will take the second and third steps in that which relates to iron until he attains complete success.

I am, Gentlemen, yours, &c.,

WILLIAM GREEN.

Oct. 31, 1857, 24, Pembroke-cottages, Caledonian-road.

BIG BEN.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Will you permit me to suggest in your magazine that the late unfortunate fracture of "Big Ben" was probably caused by the exterior and interior surfaces of the bell being in states of unequal tension? I have frequently noticed when the bell was struck, that the harmonic which was heard was the 11th above E, namely A in alto, and not the 12th, which is the ordinary harmonic; and as it is utterly inexplicable how such a harmonic could be produced in a homogeneous vibrating body, we are led to the conclusion that "Big Ben" did not fulfil that character, in consequence probably of the exterior surface having been too rapidly cooled. I may state as a corroborative circumstance that I have a glass tumbler in my possession, which gives the same harmonic, and which, on being tested with a polariscope, appears to have been but imperfectly annealed. Hoping that the re-casting will be more successful, I am, Gentlemen, yours, &c.,

HARMONIC.

U. U. C., Oct. 31, 1857.

MISCELLANEOUS INTELLIGENCE.

INSTITUTION OF CIVIL ENGINEERS.—The Council of the Institution of Civil Engineers have recently awarded the following premiums for papers which have been read during the past session:—A Telford medal to D. K. Clark, for his paper "On the Improvement of Railway Locomotive Stock;" to R. Hunt, for his paper "On the Application of Electro-Magnetism as a Motive Power;" to G. Rennie, for his paper "On the Employment of Rubble-Béton, or Concrete, in Works of Engineering and Architecture;" and to W. B. Adams, for his paper "On the Varieties of Permanent Way practically used on Railways." A Council Premium of Books, suitably bound and inscribed, to F. R. Window, for his paper "On Submarine Electric Telegraphs;" to G. B. Bruce, for his "Description of the Method of Building Bridges upon Brick Cylinders in India;" to A. S. Lukin and C. E. Conder, for their paper "On the Disturbances of Suspension Bridges, and the mode of counteracting them;" to W. Bell, for his paper "On the Laws of the Strength of Wrought and Cast Iron;" to F. R. Conder, for his paper "On the Laying of the Permanent Way of the Bordeaux and Bayonne Railway;" and to T. Dunn, for his paper "On Chain Cable and Timber Testing Machines." The Council have also issued a list of subjects, on which they invite communications, offering premiums for the same.

CIGAR MACHINE.—A paragraph has been going the round of the provincial papers, stating that M. Praetorius, of Berlin, has "*constructed*" a machine for making cigars, and that it rolls out 5,000 cigars a day, and economises both tobacco and manual labour. Upon the admitted principle, that "honour should be given to whom honour is due," it is only right to state that the paragraph in question is not quite correct. It is true that M. Praetorius, of Berlin, *possesses* such a machine, and that it combines all the useful qualities attributed to it; but *it was from Liverpool that it was obtained.* America claims, and is entitled to, the honour of the invention; but, many years ago, a Liverpool firm, Messrs. James Steel and Co., 78, Duke-street, purchased the patent, and subsequently made considerable improvements in its construction and working. The patent has many years yet to run, and it is still in the hands of the house just mentioned, who have the exclusive right of using it, or permitting its use, in the United Kingdom. M. Praetorius, of Berlin, purchased his machine from a firm in Hamburg, to whom Messrs. Steel and Co. had sold it, and it has since been patented for the kingdom of Prussia. There can be no doubt of the ingenuity and value of the machine; but while a foreign manufacturer only buys it, he must not be allowed to steal the honour of *construction* from England, or *invention* from America.

ENGLISH AND AMERICAN CANNON.—The breech loading guns made in New York for our Government, are now at Shoeburyness for trial. Since described in the *Mechanics' Magazine* in July last an English gun, invented about twenty-five years back by Mr. John Poad Drake for the use of our Government also, has attracted much attention among professional gentlemen from its compactness and simplicity. The Minister at War has placed it before the select committee for investigation, and it is expected, from its decided superiority over the American invention, an example gun will be ordered to test its merits fully. Both the English and the American gun of later date, and submitted to the committee in 1855, are constructed on the same principle with a detached charge chamber; but the English gun has but one motion of the breech for each discharge, while the American gun has six. One striking advantage in the English gun is that all the proof cannon in the service can be converted to this principle of breech loading, and thus one gun will do the duty of three by its rapidity and effective fire, while the men will not be exposed to rifles while loading, as in the old guns which are loaded at the muzzle.—*Morning Chronicle*, Nov. 3.

CATALOGUE OF SCIENTIFIC PAPERS.—The Royal Society is contemplating a catalogue of all the papers on mathematics and physics which are scattered through the transactions of scientific societies and the periodical journals. Such a thing is wanted more than the bulk of our readers can easily conceive. It is past the power of any man to know what has been written on his own subject. To wade through the volumes is impossible; to look through their contents, though difficult and repulsive, is still practicable, if those contents can be tabulated in one volume.—*Athenæum.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

HOUGHTON, F. B. *Improvements in the preparation of materials used in the manufacture of paper.* Dated Feb. 17, 1857. (No. 467.)

For reducing the fibres of wood and vegetable matters, by heated alkaline solutions in closed vessels under pressure, it is preferred to use a solution of a strength equal

to from 6½° to 7° or more of Beaumé, and heated to such a temperature as to produce a pressure of from 180 lbs. to 190 lbs. on the square inch.

COOLEY, R. B. *An improvement in the manufacture of knitted fabrics.* Dated Feb. 17, 1857. (No. 468.)

This consists in a mode of introducing an additional thread in knitted fabrics as they are made in knitting machines, so as to lessen the elasticity otherwise possessed by such descriptions of fabrics.

NAYLOR, J. *Improvements in horse-hoes.* Dated Feb. 17, 1857. (No. 470.)

In this invention each of the hoes is made capable of being moved to and from its neighbour, in order to admit of varying the distances apart of the different hoes, and the whole series of the hoes in a machine may also be moved laterally according to the requirement for the time being.

GREEN, J. *Improvements in furnaces for burning combustible gases under pressure in the manufacture of glass, iron, and other metals.* Dated Feb. 18, 1857. (No. 472.)

This consists in constructing furnaces so as to dispense with the usual chimney, air being forced into the ash-pit, and also into the furnace, from a blower. The furnace is provided with dampers for allowing the spent gases to escape, at the same time producing a pressure in the interior of the furnace, causing the oxygen of the air to commingle with the combustible gases.

CHRISTIE, H. *Improvements in finishing and polishing threads and yarns.* Dated Feb. 18, 1857. (No. 473.)

The patentee stretches the threads or yarns in the hank or skein previously sized around two rollers. These are put in motion, and while they are moving he applies a cylinder or cylinders, around which are affixed, or on which are strung washers of leather or cloth closely fastened together; or he fastens horse or other hair on such cylinders to rub against the threads as they pass by. These cylinders revolve, and rub against the threads or yarns moving past, and thus lay their fibre and impart to them polish or lustre; or the above-named washers can be used as polishing agents by a reciprocating instead of a circular motion.

BEST, R. *An improvement or improvements in illumination.* Dated Feb. 18, 1857. (No. 474.)

The patentee claims a combined gas burner and shade, in which the burner, placed out of the axis of the shade, projects a flat flame horizontally, the flame being concentric or nearly so with the axis of the shade or dome.

BLANC, J. *Improvements in making bread and biscuits.* (A communication.) Dated Feb. 18, 1857. (No. 476.)

The liquor which has been expressed from the grain is allowed to settle for twelve hours, when the starch contained will have subsided to the bottom; the liquor is then run off into another vessel and again allowed to settle, when the liquor is again run off. The last sediment is placed in bags and subjected to pressure, in order to obtain it in a dry state. The dry sediment is then mixed with the gluten, from which the liquor containing the starch was expressed, so as to form a paste which can readily be mixed with dough and made into bread or biscuits.

DAVENPORT, T. W., and S. COLE. *A new or improved method of manufacturing and ornamenting articles in papier maché and charcoal.* Dated Feb. 18, 1857. (No. 477.)

This refers to the manufacture of articles of imitation jet, such as mourning brooches, bracelets, shawl pins, &c., and consists in ornamenting such articles by the application of certain processes employed by lapidaries for producing the facets and sharply defined angles on precious stones or glass.

MOULE, J. *Improved apparatus to be used for burning pyrotechnic compositions or preparations for producing artificial lights of various colours.* Dated Feb. 18, 1857. (No. 478.)

The object here is to burn pyrotechnic compositions, and obtain the light so as to prevent the noxious vapours or gases from annoying persons near the apparatus. The patentee places the composition in a vessel which he surrounds with a glass, admitting sufficient air at bottom to cause the vapours to rise from the vessel. The admission of air is so arranged as to surround the vapours and prevent them from condensing on the inner side of the glass, and thereby obstructing the rays of light emanating from the burning composition. The vapours or gases pass from the top of the apparatus into a tube or pipe provided for the purpose, whereby they are conducted either into any convenient flue or chimney, or directly into the open air.

CHEETHAM, D. *Improvements in machinery or apparatus for preparing, spinning, and reeling cotton and other fibrous materials.* Dated Feb. 18, 1857. (No. 479.)

These cannot be described without engravings.

DYER, S. *Certain improvements in ships' windlasses, capstans, bumpkins, gins, and cranes.* Dated Feb. 18, 1857. (No. 480.)

This includes, with reference to windlasses, the lifting of the palls by means of a crank and frame which enables the weight of the anchor when let go to cause the windlass to rotate in a reverse direction; also having a rest in the middle of the body of the windlass, which nearly doubles its

strength; also having two sets of palls which enables the patentee to divide the windlass into two parts at the centre bearing, and to work one body independently of the other, or both together, merely by dropping in a joining block of iron by hand; also constructing the studded bosses or chain wheels of windlasses with a bevelled or V-shaped groove for adapting them to chains of different sizes; also the use of studded bosses or chain wheels upon the body of the windlass in combination with fair-leader studded boss sheeves or pulleys for guiding the chains into the lockers, which enables him to use only the bight of the chains, thus doing away with all need of range of cable, all round turns of cable on the body of the windlass, all need of keeping chain on deck, and thus saving the deck from much abuse; also constructing windlasses with a friction break or drag, and straps and drags for lowering the anchor by allowing the windlass to roll backwards; also leading the chain by its own weight into the chain locker over a studded boss sheeve or pulley having a pall, which enables it to aid the windlass in holding at every link. With reference to capstans, the driving them by gearing; also the constructing such gearing so as to be capable of being changed at pleasure from a slow and heavy motion to a quick and light motion, and *vice versâ*; also constructing the studded bosses or chain wheels of capstans with a bevelled or V-shaped groove for the purpose above mentioned; also the use of studded bosses or chain wheels upon the body of the capstan in combination with fair-leader studded boss sheeves or pulleys for the purpose above mentioned.

FOUCHER, L. L. *Improvements in apparatus for the manufacture of type and other articles used in letter-press printing.* Dated Feb. 18, 1857. (No. 481.)

This relates first to apparatus for casting such articles, in which the molten metal is forced into a mould by means of a pump, and consists in the arrangement of the parts of the mould, which is formed of two principal parts, one stationary and the other moveable on a fulcrum. The second apparatus consists of two knives or cutters fixed on two surfaces, mounted on an oscillating shaft, which knives cut or pare the type to a uniform substance or body. This apparatus is also applicable for casting and completing blanks, stops, vignettes, or ornaments used in letter-press printing. Another apparatus necessary to the completion of the type consists of a knife or scraper, which descends on a type laid on a slide to be scraped on one side (this being only applicable to such letters as f and g, or where the eye, that is the form of the letter, projects beyond the type) by the motion of a cam on a rotating shaft.

MEAKIN, G. F. L. *An improved method of applying breaks to railway carriages.* Dated Feb. 19, 1857. (No. 483.)

This consists in applying ropes or chains passing under or over certain mechanical appliances, consisting of rods or bars attached to the carriages and connected with the brakes for the purpose of working them, &c.

PRICE, D. L. *Improvements in electric apparatus for giving signals, and appliances connected therewith.* Dated Feb. 19, 1857. (No. 484.)

The patentee has, in the specification of a previous patent, dated 18th Dec. 1855, described certain means of giving signals by means of electric currents and mechanical arrangements, but he has since found that the centrifugal hammer of the bell by which the audible signals are given, may be liberated and set in action, and the signals given by the agency of a more feeble current of electricity, and he modifies his arrangement accordingly.

CROOK, J. *Improvements in looms for weaving elastic and other fabrics.* Dated Feb. 19, 1857. (No. 487.)

The patentee employs a loom capable of opening two sheds in the warp at the same time. In weaving elastic fabrics the elastic threads are placed in the centre, while one portion of the nonelastic threads is raised above them to form the upper shed, and the other depressed to form the lower shed. Two shuttles, working one above the other, are simultaneously passed through the two sheds by means of a batten or moveable slides or holders.

CLAYTON, T. *Improvements in machinery or apparatus for ornamenting and embossing wood, leather, paper, and other similar materials.* Dated Feb. 19, 1857. (No. 488.)

The object here is accomplished by passing the inferior woods, &c., through heated metal rollers, engraved so as to represent the reverse of the design to be reproduced either sunk or in relief; the rollers are hollow and heated by burning gas.

CLARK, W. *Improvements in the manufacture of sheet glass.* (A communication.) Dated Feb. 19, 1857. (No. 489.)

Claims—1. The maintaining a continuous supply of glass in fusion for the operation of spinning or forming sheet glass, by means of crucibles furnished with ducts or passages to allow the glass to flow away from the bottom, thus always ensuring the escape of the purest glass first. 2. Spinning or forming sheet glass by the aid of supporting hooks, or by refrigerators from a cell or chamber, having no communication with the supply of glass from the furnace,

at the upper end, and surrounded with glass in a state of fusion from which it draws the necessary supply from below. 3. The use of a certain apparatus for removing the vertical sheet of glass, and for cutting and delivering the same.

SCOTT, H. Y. D. *An improved manufacture of cement.* Dated Feb. 19, 1857. (No. 491.)

This relates to a process patented by the patentee, April 17, 1856. The object here is to impart to quick lime the properties of a cement. Lime is by mechanical means reduced to a powder, and mixed with from five to ten per cent. of its weight of gypsum, sulphate of lime (plaster of Paris), sulphate of iron, or sulphate of magnesia.

OAKES, W. *Improvements in the manufacture of iron.* Dated Feb. 20, 1857. (No. 493.)

These cannot be described without engravings.

EDWARDS, E. *Improvements in the manufacture of chains for cables and other purposes.* Dated Feb. 20, 1857. (No. 495.)

This consists—1. In making the links of which chains are formed, so that the pile or fibre of the metal will run longitudinally parallel round every link in the same direction. 2. In making chain studs of crescent or semi-oval shaped pieces of iron or steel, so that, when taken in cross section, they will represent an elliptical, semicircular, or semi-oval form, or any portion or combination thereof.

CROOK, J. R. *An improved material for, and an improvement in, the manufacture of hat tips, which material is also applicable to the manufacture of hat and other boxes or cases.* Dated Feb. 20, 1857. (No. 498.)

This consists in forming hat tips, and hat and other boxes of one, two, or more thicknesses of textile fabric stiffened by shellac or other material, and then japanned, painted, coloured, or varnished.

COMBE, J. *Improvements in the construction and driving of power looms, in the formation of shuttles, and in the winding arrangement of weft, parts of which improvements are applicable to other purposes.* Dated Feb. 20, 1857. (No. 499.)

These cannot be described without engravings.

GLOVER, J., and J. BOLD, jun. *Improvements consisting of extended uses of photography as applied to dials, tablets, and pictures.* Dated Feb. 20, 1857. (No. 501.)

This consists in printing by photographic means impressions upon white or tinted opal glass, or other vitrified substances suitable for forming dials, tablets of every kind, portraits, pictures, &c.

ZIPSER, W., and J. P. KLEIN. *Improved machinery or apparatus to be used in the manufacture of woollen cloth.* Dated Feb. 20, 1857. (No. 502.)

This consists—1. In mechanism for moving the cloth to and fro with great rapidity, the cloth passing over a carding drum or cylinder furnished with teazles which the cloth touches once during each successive rotation, thereby effecting the raising of the pile or nap. 2. In so arranging and actuating the carding cylinder or drum that it moves sufficiently slow to allow the cards or teazles to be cleaned by a brush roller, and to be changed so as to turn or reverse the teeth of the cards or teazles, by simply bending the bars they are put on, and by renewing them by other ones according to the direction in which the cloth is passing.

WHITEHEAD, J. *Improvements in boilers.* Dated Feb. 21, 1857. (No. 508.)

This relates to a form of boiler, and its setting, to be employed with apparatus for warming buildings by hot water. The boiler is saddle shaped, the furnace and fireplace being below the interior cavity. The back end of the cavity is partially closed, to check the draft. The fire bars are below the level of the boiler, and the dead plate inclined downwards from the front to leave large space for the fresh fuel, before pushing it on to the fire bars.

THOMSON, F. H. *Improvements in the manufacture of iron.* Dated Feb. 21, 1857. (No. 509.)

These cannot be described without engravings.

JOHNSON, J. H. *Improvements in spinning machines.* (A communication.) Dated Feb. 21, 1857. (No. 510.)

This relates to the "Niagara throstle" or ring traveller arrangement, and consists in communicating a gradually accelerated motion (proportionate to the increasing diameter of the bobbin) to the delivery rollers which give the yarn to the bobbins, by means of two cone pulleys and a driving belt, with a contrivance for traversing the belt along the pulleys.

BARBER, J. *Improvements in compound printing maundrils.* Dated Feb. 21, 1857 (No. 511.)

This relates to holding metal rollers employed in printing and embossing fabrics. Instead of employing the usual taper shaft or maundril for folding the roller, the patentee places it between two chucks, nuts, or coned projections upon a strong parallel shaft or maundril, with a bearing at each end, or on each chuck, &c.

MIDDLETON, J., and W. STENT. *Improvements in railway chairs, and in the jointing of rails for railways.* Dated Feb. 21, 1857. (No. 512.)

The patentee makes railway chairs in parts, so that one part slides into the other

in an angular groove cast aslant across the bed plate of the chair of which the fast cheek forms a part. The loose part has a wedge-like action, and becomes tightened when driven across the bed plate, and is thus secured by a wedge or spike driven into the sleeper. He also joins the rails, where they come in contact, by inserting a double wedge, part of it into one rail and part into the other.

TURNER, J. *Improvements in the process of manufacturing bread, and in the component parts of the same.* Dated Feb. 21, 1857. (No. 513.)

These consist of the use of Indian corn flour in combination with wheaten flour, and in a mode of preparing the same for the oven.

GROUSE, M. *An improved apparatus for giving stability to life-boats and other boats.* Dated Feb. 21, 1857. (No. 516.)

This consists of a weight (constituting the ballast) suspended at a considerable distance below the boat's bottom by means of a bar on each side of the boat, turning upon pins in the upper part of the boat.

GOSSAGE, W. *Improvements in the manufacture of soda and potash.* Dated Feb. 21, 1857. (No. 518.)

The object here is to obtain sulphur from alkali waste, for the purpose of applying such sulphur to the production of sulphuric acid, and subsequently of sulphate of soda, or sulphate of potash, in place of sulphates obtained by the consumption of native sulphur or of native pyrites. The processes adopted require elaborate description.

QUIDDE, A., and C. MAYET. *Certain improvements in propelling.* Dated Feb. 21, 1857. (No. 519.)

This consists in adapting to vessels cylinders open at one end, and fitted each with a piston working below the water.

BROWN, J. *A method or methods of preparing paper to enable it to receive an impression from an engraved block or plate, type, or other printing agent, while in a dry state.* Dated Feb. 23, 1857. (No. 524.)

This consists in coating or impregnating paper with glycerine.

LA CROIX, F. C. *An improvement in reducing and reefing the topsails of vessels.* Dated Feb. 23, 1857. (No. 525.)

This consists of a method of reefing topsails from the deck, by attaching the sails along the line of the close-reef points to the mast-head by certain tackles so rigged, through the intervention of the yard, that the lower part of the sail will constantly be kept tightly stretched by such tackles whatever the height of the topsail yard.

DEVINCENZI, G. *Improvements in producing figures and designs upon plates for printing from.* Dated Feb. 23, 1857. (No. 526.)

The inventor—1. Mixes lithographic ink or chalk with alcohol or ether, and obtains upon the surface of a plate either a regular grain or some accidental design, by simply covering the plate, or by brushes. He then prepares the plate as for lithographic printing; but, instead of ink applies some strong varnish, and engraves the plate by "biting in," either by chemical or electro-chemical action. Before preparing the plate he draws with lithographic ink or chalk any desired figure, and when the plate is varnished any design can be produced by drawing with a varnish. 2. He takes a piece of stained or marbled paper, produced in oil colours, and transfers it upon a metallic plate. 3. Instead of varnishing these plates he sometimes powders them with resinous or bituminous substance, and so prepares them for engraving. 4. He mixes strong varnish with alcohol, ether, or water, and, by simply covering the plate with such mixtures, obtains very varied designs. 5. He draws directly upon a metallic plate with a varnish, and engraves the plate by galvanic action. 6. He employs also the means specified in the first, second, third, and fourth heads to produce similar drawings and figures upon stones, which he varnishes as described, and engraves by chemical action.

SHEARMAN, J. E. *Improvements in saddles and collars for horses and other animals.* Dated Feb. 23, 1857. (No. 527.)

This consists in forming saddle-trees wholly or partially of hardened rubber, or of hardened combined with vulcanized or cured rubber, or vulcanized or cured spongy rubber, or of a combination of wood or metal and the aforesaid rubber. Also in forming the padding under saddle-trees of rubber, rubber web, or of a network of rubber web or thread, or of vulcanized or cured spongy rubber. And the invention in collars consists in forming them of hardened, vulcanized, or cured spongy rubber, or of a combination of vulcanized or cured spongy rubber and leather.

KIRKHAM, J. *Improvements in the construction of furnaces, ovens, or kilns, for drying, baking, or burning pottery or earthenware, bricks, tiles, or other similar articles, and in the means of collecting and condensing or carrying off the smoke, gases, or vapours evolved from such or other furnaces or fireplaces, or that escape or arise from the retorts and other parts of the apparatus used in the manufacture of gas.* Dated Feb. 23, 1857. (No. 528.)

This invention cannot be described in detail without engravings.

NEWTON, W. E. *An improved furnace for locomotive and other boilers.* (A communication.) Dated Feb. 23, 1857. (No. 529.)

This cannot be described without engravings.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

WITHNALL, T. *Improvements in the manufacture of copper, brass, or other metallic rollers or cylinders.* Dated Feb. 17, 1857. (No. 462.)

The inventor takes—1. A sheet of tin, fits it round an iron maundril, and solders the edges, pressing the tin into the slot of the maundril, if there be one. He then inserts the maundril with the tin covering into a roller or tube of metal, the said roller being prepared inside to receive a coating of solder, that will cause the metals to unite. He runs a composition of molten metal between the two rollers or tubes, which composition, having a portion of tin mixed with it, causes the tin to melt and adhere to the two rollers or tubes, forming one compact body, the maundril being taken out when the metal is cool. 2. He takes a thin sheet of metal, and fits it on a maundril, coating the outside as before, and puts it into another roller or tube, prepared as before, and runs a composition of molten metal between the two tubes.

KALTWASSER, A. *An improvement in the action of horizontal pianofortes.* Dated Feb. 17, 1857. (No. 466.)

The action is so arranged that when the key is struck an upright lifts the hammer; the upper end of the upright is moved by an escapement button carried by the hammer up an incline under the hammer, and the upright by its spring is brought back when the key again assumes the horizontal position.

YOUNG, W. *Improvements in fire-places or stoves.* Dated Feb. 17, 1857. (No. 469.)

This consists in arranging fire-places so that the fuel may be supplied to the under part of the fire in order that the smoke may be destroyed by the heated fuel at the top of the fire.

DE BERGUE, C. *Certain improvements in marine steam engines.* Dated Feb. 18, 1857. (No. 471.)

This consists in a mode of cooling the water which has served for condensing the steam so as to enable the same water to be used over and over again, both for condensing the steam and for feeding the boilers. This is effected by causing the warm water from the condenser to be circulated through a series of pipes, so placed along the outside of the vessel that their external surfaces shall always be in contact with the cold water through which the vessel is travelling.

RYLANDS, J. *Improvements in annealing wire.* Dated Feb. 18, 1857. (No. 475.)

The inventor merely passes the wire to be annealed through an ordinary furnace, as hitherto used for annealing glass, and passes it out of a passage by manual labour.

WILKS, L. *An apparatus for signalling between the guards and engine-drivers of railway trains, which is also applicable to other similar purposes.* Dated Feb. 19, 1857. (No. 482.)

This cannot be described without engravings.

HALSALL, W., and W. HAYHURST. *An improved self-acting temple to be employed in power-looms for weaving.* Dated Feb. 19, 1857. (No. 485.)

This relates to self-acting temples, and particularly to those wherein the holding surface is formed upon bars, constituting a roller, subdivided through its body in the direction of its axis into several parts, having a lateral sliding motion imparted to them, and consists of a similar construction, which, instead of sliding against each other and forming their own axis, slide upon a stationary axis, and have two or a few rows of points or pins fixed upon their outer surface. It also consists in the application of a cover for holding the fabric upon the distending points.

ABERNETHY, J. *An improved mode of constructing breakwaters in deep water.* Dated Feb. 19, 1857. (No. 486.)

This consists in confining a rubble embankment within a timber framework. The cross timbers of the framing are framed on land, and lowered into position without driving piles except as an after-work. The cross frames are bound together by timber panelling so as to tie them one to another.

LORD, J., and W. SOOTHILL. *Improvements in steam boilers for the more effectual consumption of smoke, whereby a great saving of coal will be effected.* Dated Feb. 19, 1857. (No. 490.)

This invention relates to Cornish boilers, and consists in adapting thereto two vessels, one above the other, and connected together by vertical pipes of small diameter. These vessels constitute the bridge of the furnace of the boiler. The back part of each of these vessels is connected to the boiler by an elbow pipe, and from the front part of the uppermost of them small pipes proceed horizontally, and are connected at their other ends to a quadrant-shaped chest, the upper part of which box is connected by a short bent pipe to the front of the boiler. The inventors also propose to arrange a series of curved pipes of small diameter across the crown of the tube of the boiler, and a few vertically, the object being to present a large heating surface and small body of water to the action of the fire.

CATO, P., and J. BETTELEY. *Improvements in the masts, yards, and spars for ships*

or sailing vessels. Dated Feb. 19, 1857. (No. 492.)

The yards are of iron, having flanges on their outsides, and between or beside such flanges the inventors place iron of an increased width to strengthen the centre portion of the yards, and between or beside such flanges they attach bulb, T, or other sectional shapes of iron to give increased strength to the yards. They also form yards of iron plates kept apart by bolts or filling pieces, and at the ends of such yards they apply wood or iron pieces also kept apart and fastened by wedges or bolts, so as to secure these parts into the main body of the yards.

HELYER, H. T. *Improvements in the construction of bridges and arched structures.* Dated Feb. 20, 1857. (No. 494.)

This consists in the united application of the principle of an arch and of the principle of a suspension bridge in one and the same structure for bridge work and arches. It is carried out by means of an upper rod passing over the back of the arch with an opening for the insertion of suspension rods connected with it, and a vertical rod passing down from the upper rod to the piers with a claw at the lower end.

GRIST, J. *Improvements in mash-tuns, and in apparatus to be employed therewith, which apparatus is also applicable to the heating and keeping up of a continuous circulation of liquids in any vessel to which it may be connected.* Dated Feb. 20, 1857. (No. 496.)

These consist—1. In dividing the interior of such tuns by perforated vessels, whereby the grains can be readily taken from the tun, a crane being employed to draw up each chamber out of the tun. 2. In fitting the tuns with a heating and circulating apparatus, consisting of an inclined cylinder fitted with tubes, the heat being applied in the middle.

BROOMAN, R. A. *Improvements in steam digging apparatus suitable for draining and excavating purposes, parts of which are applicable to reaping.* (A communication.) Dated Feb. 20, 1857. (No. 497.)

This consists of several modifications of the steam-digging machinery patented by J. H. Johnson, May 10, 1853.

JEUNE, F. C. *An improved manufacture of artificial leather.* Dated Feb. 20, 1857. (No. 500.)

The object here is to produce an elastic material having the appearance of patent leather, but not liable like it to crack or peel. The patentee first prepares an elastic compound of masticated India rubber, or India rubber combined with gutta percha, mixed with sulphuret of antimony and woollen dust or waste. This he spreads upon thin cotton cloth, and subjects the same to heat to effect the "change." The fabric is then ready to receive the Japan varnish.

ALDEBERT, I. *An improved shackle for the springs of carriages.* Dated Feb. 20, 1857. (No. 503.)

This consists in binding a piece of vulcanized India rubber with a piece of metal for retaining it in its proper shape, and preventing the elongation. The metallic band being narrower than the rubber, cuts off the communication of sound between the bottom of the spring and the top, and the bolts only passing through the rubber the vibration is not communicated to the carriage.

ADLER, E. *Improvement in spring bed-bottoms, said bottoms being applicable to other descriptions of furniture.* Dated Feb. 21, 1857. (No. 504.)

This consists in providing framework and arranging thereon a series of spiral or helical springs, provided each with a cap or disc, these discs being united one with the other, and connected with the framework by horizontally-arranged spiral springs or links.

BLAKELY, A. T. *Improvements in ordnance.* Dated Feb. 21, 1857. (No. 505.)

These relate to so forming the bore of a gun that the diameter of the bore may bear to the thickness of the metal that proportion which gives the greatest amount of strength, and best enables it to resist strain.

ELCE, J., and S. HARTLEY. *Improvements in machinery for moulding.* Dated Feb. 21, 1857. (No. 506.)

The object here is to economise manual labour in preparing moulds for casting metals. The invention consists in the application of steam or other power for ramming the sand round the mould with stampers.

FIELDING, J. *An improved apparatus applicable to steam pipes or cylinders used for heating and drying, which said apparatus may be similarly employed wherever steam is used for such purposes.* Dated Feb. 21, 1857. (No. 507.)

This consists in a certain steam chamber employed in conjunction with pipes or cylinders, and also in the disposition of valves and outlets for the steam and air passing into such chamber. The pipes for the ingress and egress of the steam, &c., are placed above the level of the water of condensation, such pipes being open and inclosed by a valve or cover.

TOUCHE, V. *Improvements in the manufacture of paper from bass or bast.* Dated Feb. 21, 1857. (No. 514.)

The inventor cuts the bass into short lengths (two inches) and afterwards cleans

it by a blowing machine, or by washing. He then subjects it to a bath of acid, and afterwards to the action of the beating machine to be reduced to "half stuff." It is then again submitted to the beating machine, and, during the action of that machine, to bleaching; it is then suitable for paper-making.

WILLIAMS, J. *Improvements in common road vehicles.* Dated Feb. 21, 1857. (No. 515.)

A vehicle somewhat similar to a dog-cart is furnished with four seats, two facing forward and two backwards, back to back. The two seats on one side are separate from those on the other, and are mounted on slides on which they may be slid to or from the front of the vehicle.

PHILLIPS, G. *Improvements in stationary cabinets, and in envelopes to be used therewith.* Dated Feb. 21, 1857. (No. 517.)

This consists—1. In forming such cabinets with pigeon holes corresponding with the ten London postal districts, each labelled with the initial letters of its corresponding district. These divisions are to contain envelopes.

WOOD, E. R. *Improvements in labels.* Dated Feb. 23, 1857. (No. 520.)

This consists in so cutting or slotting labels that a portion of the ordinary circular elastic or other bands can be introduced into the slots or cuts, and interlaced therein, for binding and labelling documents.

FOOTMAN, W. *Further utilizing the illuminating properties of gas, by improvements in burners and shades or reflectors.* Dated Feb. 23, 1857. (No. 521.)

This consists—1. In improving the batswing burner by cutting the slit of a spreading form, and smoothing, grinding, or polishing the surface of the slit. 2. In adapting thereto shades with a long narrow opening at the top, in lieu of a round hole, as heretofore, and fixing the shade in position by screwing the frame down to a shoulder formed on the pipe, so that the flame burns lengthwise under or in the narrow opening of the shade.

BOURDIER, C. A., and V. MASSELON. *Improvements in obtaining and applying motive power.* Dated Feb. 23, 1857. (No. 522.)

This consists in obtaining motive power through the agency of water with a wheel, the spokes whereof are hollow, as also certain parts of the nave. The spokes at their ends carry cup-shaped pieces of metal, which receive the water. The apparatus may be used for measuring fluids.

BANNISTER, J. J. *An improved watch and property protector pocket.* Dated Feb. 23, 1857. (No. 523.)

The pockets are made of leather, and strengthened by sheet metal, wire rings, or the like. The opening of the pocket has a fastening, and also a spring to render it self-opening.

PROVISIONAL PROTECTIONS.

Dated September 1, 1857.

2288. John George Taylor, merchant, of Glasgow. Improvements in the construction and alteration of doors, shutters, blinds, and other closures to buildings and erections so as to allow of their illumination, which improvements are also applicable to omnibuses and other vehicles, and to clock dials, lamps, and postal pillars.

Dated October 3, 1857.

2536. John Dyson, Edwin Wilkinson Shirt, and Henry Shirt, steel rollers, of Tinsley Works, near Sheffield. Improved straps or driving-bands for machinery.

Dated October 12, 1857.

2610. Prodromos B. Kyishogloo, of Constantinople. Improvements in obtaining and applying motive power.

Dated October 13, 1857.

2612. William Brookes, of Chancery-lane. Improvements in combing wool and other fibres. A communication.

2614. Charles Coffey Alger, of Newburgh, United States. An improved furnace for smelting iron.

2615. Edward Deane, of Arthur-street, London-bridge, manufacturer. An improved weapon to be used either as a sword or as a pistol, or both.

2616. Thomas Bell, of Plaistow. Improvements in the manufacture of alkaline salts.

2618. Melitton Martin, of Madrid, engineer. Improved apparatus for retarding and stopping railway carriages.

2620. James Yates, of Little Bolton, Lancaster, overlooker. Improvements in machinery or apparatus used in preparing and spinning fibrous materials.

Dated October 14, 1857.

2624. Adolphe Barthélemy Ellena, of Paris. A new mechanical means of rocking cradles.

2626. John Henry Johnson, of Lincoln's-inn-fields. Improvements in producing figured paper to be used in teaching writing and drawing. A communication from L. L. H. Bertou, of Paris.

2628. Frederick Hale Holmes, of Blackwall, analytical chemist. Improvements in magneto-electric machines.

2630. Thomas Restell, of New Kent-road, engineer. Improvements in breech-loading fire-arms, in projectiles, and in cartridges for breech loading arms.

2632. John Croft Plomley, of Maidstone, gentleman. An improved method of drying malt, hops, and other produce.

Dated October 15, 1857.

2634. Edward Wilkins, of Walworth. Improvements in frames for horticultural and vegetative purposes.

2635. William Ashby Rooke, of New Brentford. Using and employing dextrine in the making and sizing of paper.

2636. Charles Reeves, of Birmingham, manufacturer. An improvement or improvements in the manufacture of swords, matchets, and knives.

2638. Frederick Priestley, of Berners-street, Oxford-street, pianoforte manufacturer. Improvements in signal instruments or apparatus for making or transmitting electric telegraphic signals.

2639. Thomas Richardson, of Newcastle-upon-Tyne, and Manning Prentice, of Stowmarket. Improvements in the manufacture of salts and preparations of phosphoric acid.

2640. William Brown Hopper, of Camberwell. Improvements in floating docks.

2642. Joseph Gibbs, of Abingdon-street, Westminster, civil engineer. A method of treating phormium tenax, in order to render it fit for the manufacture of pulp.

2643. Paul Hellmann, of Mulhouse, France, gentleman. Certain improvements in spinning silk, cotton, wool, and other fibrous substances.

2644. Charles Walker, of New Lanark, N.B., Cotton Spinner. Improvements in atmospheric railways.

2645. Charles Walker, of New Lanark, N.B., cotton spinner. Improvements in the manufacture of manure from sewerage or drainage matters.

2646. George Scarr, of Burnley, Lancaster, joiner, and James Pollard, of the same place, mechanic. Certain improvements in power looms for weaving.

2647. Richard Wright, of Brighton, gentleman. Improvements in the application of certain fluid and other matters to heating purposes, and in apparatus for the same.

Dated October 16, 1857.

2649. John Wright, of Sheffield, spring maker. Improvements in preparing or treating strips of steel for hardening and tempering.

2650. Ward Holroyd, of Halifax, York, manufacturer, and Samuel Smith, of Shipley, said county, overlooker. Improvements in looms for weaving.

2651. Julian Bernard, of Piccadilly, gentleman. Certain improvements in the manufacture or production of boots and shoes, or other coverings for the feet, and in machinery, apparatus, and materials to be employed in such manufacture.

2652. Lucien Arbel, of Rive de Gier, France, manufacturer. Certain improvements in manufacturing wheels for carriages on railways.

2653. Richard Archibald Brooman, of 166, Fleet-street, E.C., editor of the *Mechanics' Magazine* and patent agent. An apparatus for scoring games and points at games. A communication from L. Bonneau.

2654. James Chadwick, of Castleton, print works, near Rochdale, manager. Improvements in rollers or cylinders for printing or staining the surfaces of woven fabrics, yarns, paper, and other materials.

Dated October 17, 1857.

2655. Thomas Holt, of Little Bolton, Lancaster, manager. Improvements in looms.

2656. Richard John Badge, of Newton Heath, near Manchester. An improved mode or method of securing railway chairs to the sleepers.

2657. Joseph Bentley, of Liverpool, gun manufacturer. Improvements in fire-arms.

2658. Edward Humphrys, of Deptford. Improvements in engines worked by steam or vapour.

2659. James Eastwood, of Derby, engineer. An improvement in working the valves of steam hammers by a direct self-acting motion.

2660. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. Improvements in forming the joints of pipes, for conveying water, gas, and other fluids. A communication from P. J. Guyet.

2661. Thomas Massey, of Birchin-lane, and Thomas Savage, of Soley-terrace, Pentonville. Improvements in sounding machines.

2662. William Osborne, of 9, Bow Church-yard, Cheapside. Improvements in ladies' petticoats, under skirts, and dresses.

2663. Leon Lewenberg, of New York, optician. Improvements in railway alarms and marine alarms or fog signals.

Dated October 19, 1857.

2665. John James Sieber, of Baring-street, New North-road. Improvements in power looms. A communication from H. Honegger, of Thiengen, Baden.

2667. Victor Péan, of Paris, gentleman. Improvements in protecting the walls, ceilings, wainscots, and other parts of buildings from humidity.

2669. Richard Archibald Brooman, of 166, Fleet-street, London, patent agent. Improvements in produced figured fabrics in which the design is applied by printing. A communication.

2671. Michael Henry, of Fleet-street. Improved machinery for unmaking rope or cordage. A communication.

2672. Edward Cockey, Henry Cockey, and Francis Christopher Cockey, of the Frome Iron Foundry, Somerset, engineers. Improvements in regulating the flow of fluids.

2675. William Bentham, of Halifax, York, music-seller. Improvements in harmoniums and other similar reed instruments.

2677. David Patridge, of Tavistock-place, Plumstead-common, Woolwich. Improvements in shaft bearings.

Dated October 20, 1857.

2679. Edward Briggs, of Castleton Mills, near Rochdale, spinner. An improved manufacture of printed piled fabric.

2681. George Horatio Smith, of Norfolk-street, Strand, civil engineer. An improved governor or regulator for steam and other engines.

2683. John Henry Johnson, of Lincoln's-inn-fields. Improvements in Jacquard machines, and in the cards employed therein. A communication from L. Tiphaine, J. Maurel, and G. Gagnière.

Dated October 21, 1857.

2685. Isaac Storey and John Henry Storey, of Manchester, coppersmiths and brassfounders. Improvements in water gauges for steam boilers, and in taps for steam and other fluids.

2689. Robert Duke, of Dover, shipbuilder. Improvements in the means of communicating power to ships' pumps.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," November* 3, 1857.)

1718. J. D. Garrett. An improved construction of horse-hoe.

1737. C. Fletcher. Improved machinery for making bricks, tiles, and other articles of clay or plastic materials.

1753. R. A. Brooman. Improvements in breech-loading fire arms. A communication.

1760. C. Herault. Improvements in apparatus for producing aërated waters. A communication.

1761. R. Mallet. Improvements in tiles and coverings for roofs and other parts of buildings.

1762. C. F. Vasserot. Improvements in the permanent way of railways. A communication.

1775. E. B. de la Pontonerie. Improvements in apparatus for consuming smoke.

1776. C. G. Page. Improvements in cylindrical door bolts.

1777. J. T. Pitman. Improvements in machinery for making wood screws. A communication.

1781. J. Wright, A. Wright, and F. Roberts. Treating the rhubarb plant to render its fibres applicable to the manufacture of paper, and the juice thereof to the manufacture of wine and spirits.

1782. E. J. Crocker. Improvements in the rigging of ships and other vessels. A communication.

1783. J. Ingham, E. Ingham, and B. Ingham. Improvements in preparing worsted yarns for dyeing.

1784. J. Arthington and H. Smith. Improvements for the better illumination of the Davy lamp.

1787. W. Palmer. Improvements in watering pots, garden engines, and other apparatus for watering surfaces.

1793. J. Lloyd. Improvements in utilizing and deodorizing sewage matters of dwelling-houses and other places, and in apparatus to be used in connection with the same.

1805. C. Thurber. An improved kaligraph or writing machine for writing and similar purposes.

1819. J. F. Meakin. Improvements in carriages for children, commonly called perambulators, and applicable to carriages for invalids.

1821. J. L. Field and C. Humfrey, jun. Improvements in the manufacture of candles.

1829. A. Spottiswoode. Improvements in machinery for compressing artificial fuel and other substances.

1837. F. L. H. Danchell and H. Kimber. Improvements in the manufacture of fire and waterproof bricks, plates, crucibles, and other vessels, forms for castings, and similar articles. A communication.

1840. A. P. Malard. Certain improvements in filtering water and other liquids.

1846. G. Davies. An improved marine steam engine governor. A communication.

1849. W. Rowan. Improvements in scutching and heckling flax, and other similar vegetable fibres, and in machinery employed therein.

1850. W. Rowan. Improvements in steam boilers and furnace flues.

1857. E. Ruegg. An improved calendar inkstand.

1861. W. T. Hendry and R. H. Hancock. Improvements in the manufacture of flexible tubes or hose pipes.

1874. C. Faulkner and D. Faulkner. Improvements in gun and pistol barrels, and in cannons, and in furnaces for the same.

1888. R. A. Brooman. Improvements in vices. A communication.

1889. W. Burgess. Improvements in reaping and mowing-machines.

1910. R. A. Brooman. An improvement in propelling ships, boats, and other vessels. A communication.

1914. T. Lewis, H. Parrish, and R. M. Roberts. Improvements in the separation and extraction of copper from its ores.

1960. T. Ashton. An improvement in teasing, scribbling, carding, and combing-engines.

1984. J. H. Johnson. Improvements in steam boilers. A communication.

2319. J. Nuttall and L. Stean. Improvements in fur gloves.

2441. H. Ormson. An improvement in the manufacture of cast tubular boilers.

2459. A. V. Newton. Improvements in obtaining photographic pictures. A communication.

2460. W. E. Newton. Improved machinery for forging metals. A communication.

2506. W. E. Newton. Improved apparatus for igniting gas or other lamps. A communication.

2520. J. Long and J. Long. An improved method of, and apparatus for ascertaining and registering the depth of water and the pressure of steam.

2556. J. T. Pitman. Improvements in apparatus for making candles and other analogous manufactures. A communication.

2580. W. R. Todd, jun. Improvements in manufacturing or preparing washing blue.

2583. T. Massey. An improvement in apparatus for ascertaining and recording the speed of ships.

2584. J. Wadsworth. Improvements in the production and management of artificial light and heat, and in certain parts of apparatus applicable thereto.

2587. F. H. Allman. Certain improvements in the construction of valves and taps.

2593. W. E. Newton. Improvements in stirrups or stirrup irons. A communication.

2616. T. Bell. Improvements in the manufacture of alkaline salts.

2639. T. Richardson. Improvements in the manufacture of salts and preparations of phosphoric acid.

2647. R. Wright. Improvements in the application of certain fluid and other matters to heating purposes, and in apparatus for the same.

2652. L. Arbel. Certain improvements in manufacturing wheels for carriages on railways.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2289. Auguste Edouard Loradoux Bellford.
2301. Richard Archibald Brooman.
2302. Oliver Maggs.
2305. John Coope Haddan.
2308. Robert Stirling Newall.
2310. Thomas Frederick Tyerman.
2320. James and William Bradshaw.
2373. Paul Pretsch.

LIST OF SEALED PATENTS.

Sealed October 27, 1857.

1240. Alexander John Paterson.
1246. William Edward Wiley.
1250. John Fox.
1255. William Edward Wiley.
1259. George Travis.
1269. William Bond Paul.
1351. Richard Dugdale Kay.
1374. Robert Porter Walker.
1379. Sophia Sands.
1387. Henry Trappes.
1432. William Owen.
1633. Alfred Vincent Newton.
2011. Andrew Scott.

Sealed October 29, 1857.

1238. Henry Levy.
1241. Joseph Davy and William Bentley.
1256. John Leslie.
1258. John Thomas Way.
1281. Matthew Semple.
1493. Robert Low and William Press.
1639. James Robertson.
1703. Thomas Ward.
1795. John Bourne.
1820. Henry Gilbee.
1831. Joseph Nickless.
1872. William Munt.
1880. Frederick Bousfield.
1902. Nicholas Marshall Cummins.
1948. William Edward Newton.
1989. Augustus Dacre Lacy and William Collett Homersham.
2249. James Ronald.

Sealed November 3, 1857.

1265. John Talbot Pitman.
1270. William Wilkins.
1274. Johann Philippe Becker.
1275. George Kennedy Geyelin.
1280. Henry Hogarth.
1288. Herbert Mackworth.
1294. Charles Tilston Bright and Charles De Bergue.
1296. Louis Charles Dolléans.
1308. George Heppell.
1318. James John Myers.
1326. Samuel Hallett.
1360. William Ashby.
1372. William Hartley King.
1414. Abel Foulkes.
1476. John Earnshaw, jun.
1498. Virginie Bacqueville-Pieters.
1530. John James and William Daykin Grimshaw.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1788.] SATURDAY, NOVEMBER 14, 1857. [Price 3d

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

FOWLER'S AGRICULTURAL STEAM MACHINERY.

Fig. 2.

FOWLER'S AGRICULTURAL STEAM MACHINERY.

Among the most determined of those gentlemen who have bravely set their hearts upon draining and cultivating land by means of steam machinery, is Mr. J. Fowler, jun., of London, whose various arrangements have recently attracted much attention. We propose to place before our readers a brief account of his proceedings in connection with the subject, deriving our statements from a paper drawn up by himself, and read at the Institution of Mechanical Engineers, Birmingham.

In the autumn of 1849, Mr. Fowler's attention was drawn to the great expense of laying drain tiles in the ground, and he determined to endeavour to substitute machinery for the manual operation. Having once seen a drawing of a plough which was used to make a hole in the soil for the purpose of draining, there appeared to him no difficulty in making the same machine drawing some material to be left in the hole thus made, to form the drain. This idea was afterwards found to be not new, Mr. Saul, of Garstang, having proposed it in the *Gardener's Chronicle* some years previously. It is not necessary to detail all the various experiments that occupied the first six months of an inventor's novitiate. All the tackle that could be procured was far too weak to answer the purpose. Chain and hemp rope were tried, but, when strong enough, were found to be of so great a weight as to render moving about impracticable. Recourse was then had to wire rope, and, in July, 1850, the writer was able to bring before the Royal Agricultural Society at their meeting at Exeter a machine that would bury drain pipes made of wood to the depth of 2½ feet. The machine consisted of a draining plough, attached to a moveable windlass, by which it is dragged forwards. The windlass is mounted on rollers, and worked by horses going round and round, giving motion to a vertical shaft, on which is a small bevel wheel driving a large winding pulley on a horizontal shaft. A rope laid out along the line of the drain to be cut passes once round the winding pulley, being anchored at the head of the drain, and tightened by any convenient means at the other end. The windlass thus winds itself along the rope, the horses walking up the field in a series of eccentric circles, or more properly a spiral. The plough consists of a straight beam of iron mounted on rollers, carrying a vertical coulter or knife with a round or square mole, or pointed shoe, fixed on the bottom of it, the coulter passing up and down through the iron beam so as to be adjusted to the required depth of the drain. The coulter was dropped into a hole at one end of the drain to be cut, and the drain pipes threaded on a rope attached to the shoe or mole; as the plough progressed they were pulled into the drain, the rope being detached from the shoe and drawn out again when the drain was finished.

The great inconvenience in adjusting the winding rope to the length of the field, the difficulty in keeping it tight enough to cause sufficient friction on the winding pulley, and the wear and tear caused by the friction, led to the abandonment of this plan of windlass at once, and resulted in the adoption of a more convenient form of windlass for applying horse labour to heavy field operations, such as the removing of cannon or stores over a difficult country; it is at the present time being employed in pulling down trees in Whichwood Forest in Oxfordshire, with considerable saving of labour. When properly fixed, and two men in five minutes can easily do this, the windlass is capable of resisting all the power of four horses with a leverage of 20 to 1.

The draining plough in the meantime had undergone some alterations. The beam had been lengthened and trussed, and the coulter carrying the mole or shoe was adjusted to the required depth by a ratchet and pinion worked by a screw and worm wheel. Experiments had shown the ease and accuracy with which ordinary earthen tiles could be laid, which had previously seemed doubtful; and in the spring of 1851, the plough was perfectly competent to perform drainage on good cutting clay soils, in some cases to 4 feet deep, as shown on Wormwood Scrubs, near London. But the principal fact demonstrated as bearing on the present subject, was the practicability of managing great lengths of wire rope in a field with ease, the plough being often drawn a quarter of a mile from one fixture of the windlass. With the exception of mounting the plough on wheels instead of rollers, and locking the hind wheels backwards and forwards, preserving the upright position of the coulter, no other alteration of importance was made until 1853, when it was determined to apply steam power to the draining plough.

The first attempt was by combining engine, windlass, and plough in one carriage adapted to travel over the land, winding itself along towards a fixed anchorage, the windlass being placed in front and driven by gearing from the crank shaft of the engine, while the plough was attached behind. But the great weight on hilly land and the impossibility of managing such a large machine in the field rendered it impracticable, and it was accordingly abandoned at an early stage.

The writer then determined on fixing the windlass and engine in one corner of the field, passing the winding rope along the headland, and round a pulley, anchored at the head of the drain to be cut; a smaller rope was passed round a pulley at the bottom of the field, which was unwound as the larger rope was wound up, and afterwards pulled the larger rope and plough back when the drain was finished. This worked very well, and at once proved the perfect feasibility of applying steam power to the ordinary purposes of cultivation, as exhibited at the Lincoln meeting of the Royal Agricultural Society in 1854; this conclusion was evident to many, and called forth the following remarks from the judges in their report:—"The trial of these immense implements could not fail to awaken much interest in our minds. A small 6-horse engine, with comparative ease, performed the work of 150 horses, drawing so regularly that no oscillation was observable. 'Surely,' was our remark, 'this power can be applied to more general purposes.' We earnestly commend this idea to our engineers and mechanists."

An improved mode of anchorage was now necessary, as draining in summer time to a great depth requires great power; and the former means of anchoring was very inefficient. The following plan was, after repeated experiments, hit upon. A hole is dug in the ground about 6 feet long by 3 feet deep and 15 inches wide, and two boards, hinged together back to back, are dropped into it; the draft chain is attached to arms rising from the hind board, and when pulled by the draft forces the boards open in the hole, and presses them against both sides, giving a very firm holdfast capable of resisting a pull of 10 tons.

The arrangement of tackle above described with the improved anchorage at first worked well; but the size of rope necessary to bear the greatly-increased strain could only be used advantageously over pulleys larger than could be moved in the field. A windlass and engine combined, moving itself along the headland, was therefore substituted, the winding drum being placed vertically under the boiler of an ordinary portable engine, and driven from the crank shaft by an intermediate shaft with bevel gearing. The machine is wound along the headland by a drum and rope to the head of each drain, and pulls the plough by a single rope attached direct to the plough frame without passing round any pulley; when the rope is wound up it is pulled out again by a horse, and the windlass moved on to the next drain. This plan is the one now in use, and a drain half a mile in length has been often put in by it from one fixture of the machine.

Having thus sketched the progress of the draining plough to maturity, it will be seen that the experience thus dearly bought was ready to render good service in the application of steam power to the ordinary cultivating plough.

The first experiments in steam cultivation commenced in the autumn of 1855, when the tackle was arranged with the windlass on a separate frame, and driven by a belt from the driving pulley of the engine, but otherwise differing only in strength from the windlass adopted in 1853 and 1854 for the draining plough. The success of this windlass seemed certain from the first, and it is being successfully worked now, in exactly the same form as then made. The first trial of it was with a scarifier, which it worked perfectly, turning it round at the headlands with ease, this being accomplished by attaching both ropes to the front of the machine and reversing the pull on the ropes.

A means by which steam power could practically be applied to the surface of the soil having been discovered, the next was to consider the best mode of applying that power; and the much despised plough in its different modifications seemed the most likely instrument for accomplishing this end. In using the ordinary plough, if turned in the same furrow, it will be seen at once that one furrow would be turned over to one side, and the other to the opposite side; and when worked by horses this difficulty is overcome by moving the plough some distance along the headland, returning on the opposite side of the ridge thus left between; but this plan is impracticable with steam power, as there is no means by which the plough could be moved along the headland, except by extraneous labour. The turnwrest plough, which ploughs all one way, the mouldboard being changed alternately from side to side, could be worked by steam; but except in Kent this has always been found a complicated, and, to judge by its want of success, an impracticable machine; and to combine such a number of these ploughs as would be required for steam ploughing seemed out of the question.

It became necessary, therefore, to devise a plough that would return in the same track, and also turn the furrow in the same direction, without involving the complications of the present turnwrest plough. In order to do this the present plan was devised, as shown in figs. 1 and 2, page 459, having two sets of ploughs, one set, A, right-handed, and the other set B, left-handed, attached to the same frame, C, and balanced on a pair of wheels, D. By this arrangement, while one set is going up the field in work, the other set is in the air, the relative position being reversed at the end of the furrow; the wheels are then locked round the swivel joint, E, through the distance required to set the plough into the next

furrow. This is easily done by one man, who rides on the seat, F, on the plough frame, and locks the wheels, D, by means of the hand wheel, G. The first experiment showed the entire success of this plan.

Another form of windlass, differing from that last described, was also necessary; for previous experience in draining had proved that the crookedness of the fields, and the angle at which it was often necessary to plough in order to render the machine generally available, rendered it essential to mount the winding drum on a vertical axis instead of a horizontal one; and it is evident that a rope will wind on an upright drum from any part of the field, but on a horizontal drum the rope must lead off always at right angles to the axis. The windlass is accordingly made with two vertical winding drums driven by the engine; the engine and windlass are placed on one side of the field, and a rope from each winding drum passes round a pulley or snatch block at the end of each headland, and round another pulley at each end of the furrow, the ends of each rope being attached to the plough frame. The anchors adopted in this arrangement consist simply of a cart body filled with earth, mounted on wrought iron discs for wheels, which cut into the land as the cart travels; the cart being set to travel at right angles to the line of draft of the plough, forms a perfect anchor, easily moved in one direction, but forming a powerful holdfast in the other.

Thus in the spring of 1856, at the Paris and Chelmsford agricultural meetings, machinery was exhibited adapted to bring into use the ordinary portable engines at present employed on a farm, for the purpose of ploughing, drilling, and scarifying by steam. As shown on these occasions, the system differed from the plan now in use only in the mode of moving the anchor carriages and of steering the plough. The anchor carriages were then moved by a separate rope passing round the pulley in the corner of the field, and pulled by the men at the windlass when required. This is now accomplished by the main winding rope passing round the pulley or snatch block, which, of course, tends to bring the anchor carriage and pulley nearer together. The anchor carriage is moored behind by a chain to a stake driven in the ground or to anchor boards, by which it is held in its required place; and the mooring chain is lengthened any required amount by the ploughman at the end of each furrow, so that when the plough commences work at the opposite end of the field, and the strain comes on the winding rope, the anchor carriage moves forward the required distance until the mooring chain becomes tight.

The plough was formerly steered by a man walking in front of it, with a long pole in his hand; but now the man rides on the seat, fig. 1, steering the plough by locking the wheels, D, by means of the hand wheel, G; and so perfect is this means of steerage that he can run entirely out of the line of draft, until the rope stands at an angle of 1 in 2 to the direction of the plough, so that no accuracy is required in setting the anchors.

If the farmer will allow his ordinary farm engine to be taken off its wheels when used for ploughing and put on the windlass, the engine and windlass combined can then be moved along the headland, as in the latest plan of the draining plough. The engine and windlass then form one anchor, and all that is required is one moveable anchor at the opposite end of the field, without any snatch blocks and with much less rope, the moving of the anchor carriage being accomplished by a subsidiary rope, wound on a small drum on the anchor carriage, to which a slow rotation is given by a screw and worm wheel worked by the rotation of the large drum. This plan reduces the tackle in number of parts and in cost of construction, and is the best form in which it seems possible to arrange it; in making new tackle this is decidedly the arrangement to be recommended.

(*To be continued.*)

SUBMARINE TELEGRAPH CABLES.

The article on submarine telegraph cables, written by Mr. Bodie, master of the *Agamemnon*, and published in our Magazine for October 24—31, affords ground for a remark or two upon the subject. Mr. Bodie's views and suggestions are the result of the thoughtful observation, by a highly intelligent and experienced seaman, of the arrangements and appliances carried out in connection with the recent attempt to lay an electric cable between England and America. He came to the subject without bias, and wholly uninfluenced by the discussions which have for several years proceeded among practical men of science. Now, what are the conclusions to which Mr. Bodie, so circumstanced, arrives? Briefly these: that for deep water cables, *light ropes*, and light ropes only, should be used, because any considerable weight in a cable, above that of the water displaced by it, is quite useless, and probably renders the cable irrecoverable, should it break: that, a light cable being used, the speed of the paying-out ship should be as great as its issue from the hold will allow, and the strain put upon

the cable be very small indeed; and that the shore ends of such cables should be stout and well defended, to resist the action of waves and breakers. Practically, he proposes to dispense, in the case of the light ropes, with the defending iron wires ordinarily used outside of the ropes, and to apply over the gutta-percha an outside hempen covering for affording strength.

Now, if we modify Mr. Bodie's proposed rope, by making the metallic conductor sufficiently strong to bear the same strain as his will sustain, and dispense with his hempen covering, we shall secure a still better result, and shall obtain a strong and light deep sea rope, well insulated, and of good conducting power. But by modifying Mr. Bodie's rope in this way, we shall, as our readers will perceive, arrive at precisely that kind of deep sea rope which Mr. Allan has for years advocated in our pages, and which the *Times* strenuously recommended during the present year, and before the Atlantic cable was shipped for laying.

Three years since, in a letter addressed to ourselves, Mr. Allan said: "If the rope, as to weight, be so constituted as to have a relatively greater specific gravity to the water, *and no more than required for the purpose of submerging itself gradually*, it will follow that such a line may be laid out horizontally, without the use of breaks. * * In my plans and arrangements for carrying out these principles, the core or conductor is formed entirely of iron, thus forming both the conductor of electricity, and at the same time the strength or backbone of the rope."

We recur to this subject, to show that the experience of intelligent and unbiassed men goes to confirm the recommendation of Mr. Allan, the *Times*, and ourselves, although, for some inexplicable reason or another, no one has as yet thought it worth his while to carry into operation a plan of so much promise, notwithstanding that it has economy, security, and facility of trial all in its favour.

Inventors in France. — The *Sun* of Saturday last states that on Nov. 16th, a society will be inaugurated in Paris for the purpose of affording inventors an opportunity of bringing forward any improvements they may feel disposed to make public. Weekly meetings are to be held in furtherance of the object. Such a society will be valuable if well conducted, but the management of it will require great care.

THE DRAINAGE OF LONDON.

Mr. Frederick Lipscombe, the Filter manufacturer, of Temple Bar, London, has issued a circular on the above subject, comprising certain new suggestions. The following is a condensed statement of his views, some of which well deserve attention, particularly those which relate to the adoption of remote outfalls, and the division of the drainage:

The right method of getting rid of the London sewage is an hydraulic problem, which Mr. Lipscombe, an hydraulist, believes he has solved. It resolves itself into three questions:

1st. Where shall the outfalls be?

2nd. How shall the sewage be conveyed to these outfalls?

3rd. Where shall it drain to before leaving London?

1. It is desirable that no part of the Thames should be defiled by sewage; therefore, the most suitable position for outfall would be the Essex coast, so as to discharge the sewage directly into the German Ocean, several miles away from the Nore. The sewage should be discharged in the manner hereafter mentioned, at very high velocities; not at one point only, but at several points; by this arrangement, it will be diluted with so great an extent of sea water, as entirely to prevent effluvia, or injuring the oyster banks, and also by gushing out at high velocities, will form channels to deep water, and so be precluded from depositing matter on the sea shore.

2. The sewage must not be conveyed through long open channels (which must necessarily be very wide), or stored in vast reservoirs, as the stench from the putrescent mass would be intolerable *all the year through*, and consequently be a far greater nuisance than the Thames now is. The Government referees have made a tremendous miscalculation as to the quantity those two ditches could discharge during 24 hours; they will be unable, with their sluggish flow of 2½ feet per second (barely 1¾ mile per hour) to discharge even one-tenth of the quantity the referees have estimated; consequently it is an error in the referees to suppose they can dilute the sewage. Moreover, open ditches would become frost bound during a severe winter, and so be rendered useless, probably for weeks together; a strong head wind even might stop their flow. In conveying sewage to a long distance, we must take care not to discharge it at only one or two points, because it would not then be quickly diluted, and would at those points always smell during the summer months, most probably even more abominably than the Thames, at London; it is, therefore, advisable to discharge the sew-

age at many points, far apart, that it may become quickly diluted with a large mass of water. Then again it is indispensable that the sewage should be discharged at high velocities that it may be carried to a considerable distance before any of its heavy matter can be deposited, that shoals may not be formed. All the great difficulties that have been experienced in endeavouring to procure a practicable and thoroughly efficient plan can be traced to the fact, that the principle of a gradual fall, or inclined plane, has been supposed to be equal to the task of efficiently conveying the metropolitan sewage many miles away; whereas in reality it is impracticable to do so by means of that principle—simply because it is preeminently *the* principle of slow motion. The principle of a gradual fall or incline plane answers most admirably for *collecting* house drainage, and is nature's plan for *collecting* the drainage of extensive districts; but is quite unsuitable for the mere purpose of conveying it rapidly many miles away, and eventually discharging it at a high velocity. The patentee finding that the incline plane principle was unsuitable, and having been taught, by his experiments, that a pipe when made to start with an abrupt downward direction, with the view of obtaining the utmost amount of hydrostatic pressure and then carried in a horizontal line to its outfall, gave the highest possible velocity to water travelling through it, proposes to convey the sewage away from London by means of several pipes laid down upon this principle.

3. A great portion of London has considerable elevation above high water mark; we must therefore take the fullest advantage of this, because the higher we can intercept the sewage, the faster it will run to the distant outfalls, and therefore the smaller need be its discharge pipes, and consequently the less they will cost. Mr. Lipscombe proposes to divide London into several districts, grouping, for example, all that large contiguous portion having such an elevation as will enable it to drain to a convenient point within its own area, say 80 feet above high water mark; this forming No. 1, or the most elevated district. No. 2 will be less elevated. No. 3 still less, and so on. Each district will be connected with an iron pipe, as before described, that will drain rapidly its sewage to any desired point on the Essex or Kentish shore. Any simple valve placed at either end of the pipe will prevent spring and other unusually high tides entering the pipe. Thus may nearly every part of London be drained to distant outfalls, without any pumping being required. Any excess of storm water may be provided for by separate channels to the river. Rainfall should be separated from sewage wherever it can be done.

The above may be taken as a tolerably full statement of Mr. Lipscombe's views.

WILKINS' PATENT TRAIL FOR LAYING SUBMARINE TELEGRAPH CABLES.

At page 512 of our last volume we published a verbal description of an invention patented for the above purpose by Mr. W. Wilkins, of the firm of Wilkins and Weatherly, rope-makers, Wapping, and consisting in the use of a flexible tube or trail attached to the stern of the ship, from which the cable is payed out, the cable being passed through this tube or trail on its way to the sea. As we consider this to be an invention which, if carried out, would add greatly to the security of the cable to be laid, we now supply an illustrated description of it:

Fig. 1 is an external view of the metallic vertebrated tube which Mr. Wilkins prefers to employ. It is made of case-hardened steel, smooth on the inside, and is composed of a number of short lengths, A A, cut away at the ends, as shown at B B, and provided with lugs through which pins which connect them pass. This tube will possess the requisite flexibility, and is to be covered with two flat iron wire ropes, each lapped half round the tube, and sewn together with strands of wire, a space being left between the two ropes on each side of the tube, in order that water may enter, or that the waste lubricating grease may escape from the tube freely. In some cases he proposes to apply to the trail, along a portion of its length, a buoyant tube, in order to float, or to assist in supporting the trail in the water. This buoyant tube will not be required at that part of the trail which is near the ship, but may commence at a distance, of about forty fathoms, say, from the ship, and continue to the end, tapering considerably towards the extremity. This tube may be made of copper, zinc, or other metal, or of gutta percha, but the latter is greatly preferred on account of its flexibility. It may be made in separate pieces of any convenient lengths, and connected together in any suitable manner. This buoyant tube may be connected to the "trail" tube by copper bands, as shown in figs. 2 and 3, in which A is the trail tube, B the buoyant tube, and C C are the connecting copper bands. The application of this tube will assist the trail to assume and maintain the position required to be given to it, and will also prevent it from twisting.

In fitting such a trail as that described, each piece of the vertebrated tube must be passed

over a piece of a cable to be submerged, or over a piece of wire strand, by which the cable may be drawn through it before the vertebrated tube is enclosed in the ropes. The end pieces of the vertebrated tube should be bell-mouthed at their extremities, and somewhat stouter than the other pieces.

In some cases the patentee proposes to form the trail of a buoyant tube supporting a series of rollers in frames, the tube and

Fig. 1.

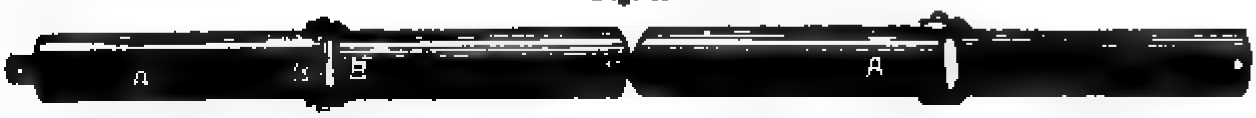


Fig. 2.

Fig. 3.

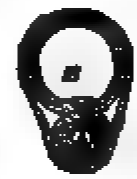


Fig. 4.

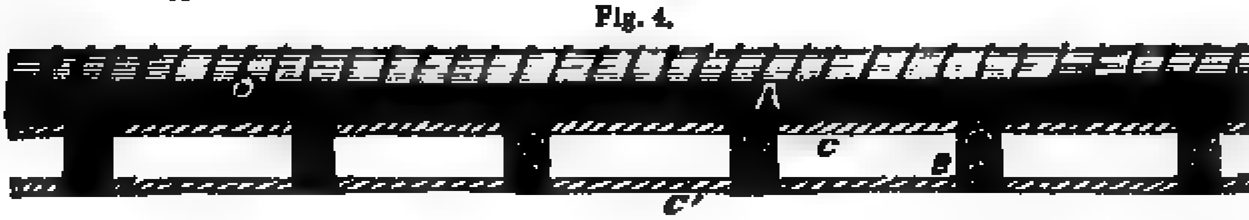


Fig. 5.

the frames being connected by means of wire ropes to which they are riveted. This arrangement is represented in side elevation at fig. 4. A A is the buoyant tube, which is formed like the similar tube already described; B B are the frames in which are mounted rollers or pulleys on axles. The rollers or pulleys are grooved with semicircular grooves, in order that the adjacent ones may have a circular space between them, through which space the cable to be laid passes, being guided in its course by the pulleys. The frames, B B, are riveted both above and below to two wire ropes, C C', by means of rivets and rivet plates. The tube, A A, is bound to the rope, E, by a wire strand, D D, which passes round the tube, A, and through the middle of the rope, C, at intervals of about six or eight inches. Between the ends of the pulleys and the sides of the frames, B B, washers are placed. The frames, B B, and ropes, C C', are enclosed in a case of stout double canvas coated on both sides with gutta percha.

As the friction of the cable and the pulleys of the trail just described would be insufficient in some cases to prevent the too rapid delivery of the cable, Mr. Wilkins proposes in such cases to attach at the extreme end of the trail a break, by which any required amount of resistance may be applied to the cable. For this purpose he employs a series of grooved pulleys, G G, mounted between two iron plates, I I, as shown at fig. 5. The cable passes alternately over and under the successive pulleys. The grooves of the pulleys are of a V-form in section, but not sharp. The pulleys are furnished with flat arms, which present themselves transversely to the water, in order to retard the velocity with which the pulleys tend to revolve, the width of these arms being proportioned to the amount of resistance required. The pulleys are varied in size and number according to the description of cable to be paid out, a sufficient number being used to produce upon the whole a resistance not greater than about one-third of the breaking strain of the cable. The two plates are strongly connected at top and bottom, and the end of the trail being brought in between the two plates, is attached thereto with rivets which pass through the plates, I I, and the ropes, C C'. The outer end of the break is sometimes provided with a pair of rollers, K K, similar to the rollers in the trail, and through these the cable passes finally into the sea. A flattened buoyant tube, L, is sometimes attached to the upper side of the break apparatus, in order to buoy up, or partially buoy up, that apparatus. A trail of the

description last described is fixed to the paying-out ship as near to the water's edge as possible.

ASIATIC CHOLERA AND ITS PREVENTION.*

BY HENRY M'CORMAC, M.D.

As physician to the Belfast Cholera Hospital, I had unusual experience in the treatment of Asiatic cholera. During the earlier outbreaks of this malady, opium and calomel were among the remedies most confided in. During the more recent outbursts, however, a new and additional remedy of great efficacy was resorted to. This remedy consisted of the dilute acids, any of them. Use and convenience gave the preference to dilute sulphuric acid, and to this dilute acid, more or less combined with opiates, I habitually restricted myself. The name of the person who introduced this remedy, like that of many another benefactor of his species, is unknown. The elixir of vitriol, which is merely sulphuric acid diluted with spirit, and the addition of a little aromatic, is, in respect of cholera, in very many cases, literally and truly the elixir of life. Twenty drops, in a little water, may be taken every time the bowels are affected, also every two hours for some hours after. But dilute sulphuric acid—that is to say, sulphuric acid one part, water seven parts—has precisely the same medicinal properties. Here, thirty drops in a little water will be an expedient dose. To children, two drops for each year of the child's life may be given. Otherwise the mode is the same.

I now come to another feature in respect of the efficacy of dilute sulphuric acid. I find that it possesses preventative as well as curative properties. On the occasion of the outbreak of cholera in the Belfast District Lunatic Asylum, and after many deaths had ensued, I put the whole establishment on a prophylactic or preventative regimen. I added dilute sulphuric acid, in the proportion of half an ounce of dilute sulphuric acid to twelve ounces of water. Of this mixture I caused one tablespoonful, further diluted with a little water, to be swallowed each morning by every inmate. Very soon after the cholera had completely disappeared. There is here the alternative of supposing that the disease spontaneously vanished, or that the dilute sulphuric acid had acted as a prophylactic. I myself prefer the latter conclusion. It is reasonable to conclude that a substance which possesses the property of constipating the bowels, should be adverse to the propagation of cholera. Now, dilute sulphuric acid possesses this property. It is also conformable to the efficacy of prophylactic measures generally, though greatly exceeding the efficacy of most in the prevention of disease. Sulphuric acid is cheap as it is effective. A pound of strong sulphuric acid, costing one penny, will make seven pounds of dilute sulphuric acid, which, further diluted, would furnish a prophylactic draught to the whole of a regiment. And this brings me to the object and intent of these remarks. They are intended to serve our suffering countrymen in India, engaged with a murderous enemy, and assailed by cholera, equally murderous. It is of great moment to cure disease, but it is yet more momentous to prevent it. I, therefore, have recourse to the wings of the press in order to disseminate a suggestion which, if acted upon, I feel assured is calculated to avert many a pang, and in the East, as well as elsewhere, rescue lives of priceless value.

Belfast, Oct. 3rd, 1857.

* The above paper, although scarcely suitable to our pages, is inserted in the hope that its appearance may lead to the confirmation of Dr. M'Cormac's views, if they be correct, or to their disproval, if they be wrong.—Eds. M. M.

BLACKBURNS' TRANSPORTING ENGINES FOR AGRICULTURAL AND OTHER PURPOSES.

Attempts were made in Scotland some years since to produce a convenient transporting engine, by placing a motive machine in a large drum, which should answer the purpose of wheels; but no useful result of importance was obtained. Recently, however, Messrs. Blackburn, engineers, have given the plan a practicable and highly efficient form. According to their method, a boiler and steam cylinders are suspended inside of a cylinder or drum of considerable diameter, in such manner that the boiler, steam cylinders, and the gear shall always be in the same plane, while they cause the drum through toothed gear to rotate round them, and thus perform an onward motion. From the extended bearing of the engine, and the easy rolling motion imparted to it, it will advance steadily over rough and uneven ground, and may be employed to drag after it ploughs and other implements, or implements may be driven by it in advance, or it is calculated to both drive and draw them; and by itself it may be employed as a roller, or as a means of transporting passengers, goods, minerals, &c., over common roads or tracts of country impassable for horses or the ordinary modes of transport. Or it may be used as a traction engine. A frame carried out from the sides, and made to unite and form a bearing

for the axis of a guide wheel or wheels, whereby the implement may be guided or turned, is so connected to it that it may be turned over and act as a guide, either before or behind the machine. The implement may be used as a stationary engine by disengaging the toothed gear which causes the drum to rotate, and may be employed in pumping, threshing, or otherwise.

MILLER'S METHOD OF PROPELLING VESSELS.

We have received from Mr. Miller a long letter ostensibly on his method of propelling vessels, but really consisting of a number of statements and reflections which have but little really to do with the subject. It may be epitomised thus:—He admits he has not an adequate knowledge of scientific principles, and has therefore "sought after 'sufficient authority,'" but the only person mentioned by him is a "venerable dame" who "taught his lisping tongue the rudiments of education;" he then traces the causes which led him to seek an improved method of propelling vessels, shows the advantages of placing propellers in the middle of the ship at the bottom, says the passages we put in italics as announcing unsound principles "clearly indicate our own crude and anomalous reasoning," as we "admit the statical pressure of water to be in proportion to the depth, yet deny that the difficulty of displacing or raising it increases in the same ratio!" and finally refers us to an article in the *Shipping Gazette*, recommending a trial of Mr. Miller's proposal, and denying that it is ridiculous. Now we must really deal somewhat roughly with such gentlemen as Mr. Miller, who, after we take the trouble to give them good advice and set them right, instead of replying to our arguments, or assenting to them if there be no reply to make, straightway complain of our conduct, and set up for our imitation some newspaper or other, of no authority whatever on the matter in question. Is Mr. Miller beside himself, that he should refer the *Mechanics' Magazine* to the *Shipping Gazette* on a question of science; or is it out of mere ignorance that he does so? Whichever it may be, we have done with Mr. Miller, and are quite willing to let him have his way. To prove us wrong, let him propel a ship with his apparatus—if he can!

SYPHON FOUNTAIN.

To the Editors of the Mechanics' Magazine.

Gentlemen,—The fountain, of which a description is appended, I have found very useful as applied to a tank aquarium, it being simple and inexpensive. It is also of use *in any position where the supply is at a lower level than the nozzle.* When once started, it continues to play till the water is exhausted. My sketch represents its application to a pedestal parlour fountain. In proof of its simplicity, I may mention that my first was constructed with a corked pickle bottle, two pieces of tobacco pipe, and 2′·6″ of ¼ inch India rubber tube, and a washhand basin. S is a glass shade, fixed air tight to the plate, P. Y is the supply pipe, and W the waste, which delivers into the vessel, V, which must not, of course, be air tight. T is a tap for withdrawing the water when V becomes full. The water is then returned to the basin, B. To start the fountain the trap door at D is opened, and the air withdrawn by the mouth from the India rubber waste. The end of the pipe is then replaced, and the trap door closed.

Edward A. Copland.

Bellefield, Chelmsford,
Nov. 2, 1857.

A VOYAGE IN THE AIR.

The Paris journal, *Les Contemporains*, gives an account of a voyage between France and Algeria and back in an aërial ship, the invention of M. Gavarni, an artist. M. Henri Page tells the tale, which may be condensed as follows:—After studying for six years, Gavarni succeeded in completing a machine, at a cost of 300,000 francs, by means of which machine he hoped to be able to sail in the air in all directions. The preparations for the voyage were made in as private a manner as possible. Only four persons were allowed to be in the secret, on the promise that they should sail with Gavarni. They were, first, Le Comte de Pleuvier; Mons. Edward Migeon, Professor of the physical and mathematical sciences; M. Jules Falconer, an aëronaut, whose acquaintance Gavarni had made in Scotland, and who came from Glasgow for the purpose; and M. Page, whose duty it was to keep the journal. The machine consists of two spherical balloons, fixed together, containing 100 cubic metres of pure hydrogen gas. The propelling power is obtained by a peculiar sort of screw, reaching as far as the car, which is provided with a rudder of whalebone. Gavarni lets her ascend without throwing out any ballast. The gas which escapes is re-supplied by a secret chemical process, invented by M. Migeon, and also by means of a small instrument of Gavarni's invention. The old system is followed as regards descending. On the morning of the 15th Jan. last the adventurers ascended "with the rapidity of a cannon ball." M. Page was seized with anxiety and fright, but the English aëronaut's *sang froid* did not leave him for an instant. A quarter of an hour passed in silence. The sight of the earth was sublime above description. While drifting to the north-east, towns and villages looked like toys; and the river Loire, in which the rays of the sun were just reflecting, looked like a golden stripe through a green carpet. "We have the wind against us," said Gavarni; "now or never is the moment to try my screw. Gentlemen, I mean to steer right in the wind for Algiers, where Marshal Gaudon impatiently looks out for our arrival." Immediately afterwards he turned the rudder, and put the screw in motion; the gigantic balloon remained motionless for some seconds, then followed the direction which her master pointed out. The Loire was passed at twelve o'clock. At two o'clock Gavarni saw the sea. At 2 h. 30 m. Nismes was passed, leaving Marseilles on the left, and Toulon on the right. The sea was soon beneath. Gavarni now resolved to get into a lower current of air, and to have the balloon perceived by the ships in the Mediterranean. It was soon seen, and created the greatest astonishment. Conversation now turned to the important consequences which the new invention must create. M. Page said he fancied air ships could only reach a certain height, because, on getting out of this planet's atmosphere, they would find but empty space. "That is an error," exclaimed Gavarni, "it is not an empty space; no world can exist in an empty space. If I can only find the means to take with me a sufficient quantity of air for respiration, I shall take a trip to the moon. Yes, you may laugh at me! I am of Fontenelle's opinion, and believe that all globes are inhabited. After the system of the creation, all the great celestial globes must offer us an immensely far extended view. Each of them, no doubt, has its own atmosphere as well as we have ours. If I only reach the first planet, I shall renew my provision of air, and shape my course for another world. I shall pass the stars. I shall penetrate to the immense and unknown. I shall reach the throne of the Great God!" "At the utterance of these words," says M. Page, "Gavarni's eyes shot fire, his head appeared as if surrounded with a bright steel circle: I fancied that I saw old Prometheus ready to steal the fire from heaven." At the earliest dawn of the next day Gavarni cried, "Awake, awake, gentlemen! Algeria is in sight, and we are about to make our descent." In six minutes they landed about a mile from Algiers. His Excellency, Marshal Gaudon, pressed Gavarni's hand most warmly. On Saturday, at noon, the party ascended from the heads of Algiers, in the presence of an immense crowd. Nothing particular occurred on the return, save that the air ship travelled faster than before; and on Monday, at 4 h. 23 m. P.M., descended in the grounds of Comte de Pleuvier's park.

RAILWAY GUARD AND PASSENGER SIGNALS.

The suggestion of Capt. Norton, respecting the use of simple percussion signals by railway guards and passengers, for giving notice of danger, should not be passed lightly over. He proposes to substitute for his metallic signals, others made of wood or pasteboard, with which each guard and each carriage of a railway train may be supplied at a trifling cost. He would also attach to each carriage a small perpendicular tube, open at the bottom, and furnished with a crossbar or stirrup of iron for the signal to strike against. By these means, danger signals might with ease and certainty be

made, should occasion require. The subordinate railway officers who have seen the plan tried speak highly of it. Mr. Porch, the station master at the Gravesend station of the North Kent Railway, understands the matter, and will show the signals to gentlemen who apply to him for the purpose.

GOVERNMENT REWARDS FOR RIFLE BULLETS.

A petition has been presented to the House of Lords, by Mr. B. Predavalle, soliciting a reward for having presented to Lord Panmure the description of rifle ball now adopted by the British army. On the 16th of January, 1857, Mr. Predavalle wrote to Lord Panmure to the effect that while the Committee of the Board of Ordnance had resolved upon recommending that the sum of £1,000 should be awarded to Mr. Greener as a premium for "having laid before the Board of Ordnance a plan of getting rid of all windage in the rifle bullet," it did not appear from the statement of the Committee of the Board of Ordnance that the description of bullet proposed by Mr. Greener is the one whose excellence was manifested in the recent Crimean campaign; and that Mr. Greener himself has stated, in the *Times* of the 25th December, 1841, that his plan "*had been laid, by the authorities, upon the shelf," and never once put into practice.* "In June, 1834," said Mr. Predavalle, "I presented to the Royal Society, in London, and subsequently, in 1837, to the Académie des Sciences in Paris, a memoire," in which was "a complete description of the bullet adopted by Her Majesty's Government, fully establishing my claim to priority of invention; such bullet being by the French called Minié's, in consequence of M. Minié having introduced it to the French army after my publication." Lord Panmure acknowledged the receipt of the communication, and in reply stated that he could not perceive that the publication referred to gave any grounds for a claim on the British Government, and that it was not his intention, in recommending Mr. Greener for a reward, to base that recommendation on absolute priority of invention, "but on priority in bringing the principle of expansion to the notice of the War Department." Mr. Predavalle then again wrote to Lord Panmure, pointing out that he had received the thanks of the Minister of War for his work before the extensive contracts given by the Government to Mr. Preston, and that "the *Mechanics' Magazine*, No. 1674, page 218, fig. 12, shows the identical construction of ball described in his work;" and suggesting "that if a reward is adjudged to Mr. Greener for an idea which has never been put into practice, the inventor of the ball now adopted by the British army ought not to be left unrewarded." Lord Panmure again replied, stating that he saw no grounds for taking any other view of the application than that already communicated. Mr. Predavalle's petition goes minutely into the whole question, and deserves to be well considered, if justice is to be done in the matter.

THE LAUNCH OF THE LEVIATHAN.

At the inquest held on a man who has died from a hurt received at the above launch, Mr. Brunel made a statement which shows that the account of the accident which obtained currency last week was not altogether correct. Mr. Brunel attributes the running away of the check drum handles to the circumstance that he under-estimated the motion of the ship, and had too light a pressure put upon the breaks, in consequence of which the men who were (but who should not at that time have been) at the handles were thrown up and injured. This statement says much for the candour of Mr. Brunel, but whether it reflects upon his skill or not is an open question.

MONSTER GUNS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I have just seen in your number of 7th November a letter from Captain Blakely on the above subject. I agree with him that it is unimportant now to raise the question of priority; but I may simply mention that my own experiments, the results of which Captain Blakely mentioned in his paper read at the late meeting of the British Association, were made in May, 1855, and the results were such as to induce me, as soon as possible afterwards, to bring the subject to the notice of Government, which I accordingly did on June 19, 1855.

It is not my intention at present to enter into any narrative of the proceedings at Woolwich, which resulted from my endeavours to bring the principle I advocated to a fair and sufficient trial. I will only add, that, up to the present time, no such trial has, to my knowledge, been made.

The principle which I advocated, and which nothing that has taken place since has shaken my confidence in, is the same as that upheld by Captain Blakely and Mr. Mallet; but I believe that the mode of carrying the principle into effect adopted by

both those gentlemen presents practical difficulties, which may lead to indifferent results. The principle is, that each concentric layer of the gun shall, at the moment of bursting, be strained to its full tensile power.

With hoops or rings this can only be rudely approximated to; first, because the thickness of each individual ring must bear a very considerable ratio to the aggregate thickness; and second, that it is impossible so to adjust the diameters of the rings, as that, when driven or contracted on, we can be sure of the actual state of tension.

By the adoption of wire, which I advocate, and, which, I must also add, Captain Blakely also contemplated from the beginning, these difficulties are all but actually removed. The wire end may be so small that each layer will bear a very small proportion to the total thickness; and the strain on each layer may be adjusted with all but mathematical precision.

We thus obtain a gun approaching very nearly to the condition of maximum strength, and if the tensions of the several wire coils be properly calculated and adhered to in laying on, this gun cannot burst until every coil is strained to its highest limit of resistance.

Another great advantage of this system over hoops is that there is no tendency to displacement or shaking loose from the concussion of fire. The wire is continuous, and may be laid so close as to be equal to a homogeneous solid. I am of opinion that, however accurate the workmanship and careful the superintendence, the hooped guns will eventually shake loose under heavy charges.

Lastly, I may add, that the wire guns can be made at a cost far below the hooped guns, and I believe even below the ordinary cast iron guns now in use.

Certain it is that they are vastly superior in strength and lightness, although, for some purposes, the latter is said to be of no importance. Perhaps not with our present system of gun carriages, but that both field and siege artillery could be constructed on the above principles of dimensions and efficacy far beyond those now in use is a point upon which I have not a shadow of a doubt.

As an instance of what may be done, I may mention that I have thrown 9 lb. conical shot from a gun of this construction, viz., cast iron, bound with wire, and obtained a range of 1,500 yards with 7° elevation. The gun weighed about 2¼ cwt.

I am, Gentlemen, yours, &c.,

JAS. A. LONGRIDGE.

18, Abingdon-street, Westminster,
9th November, 1857.

ROBERTS'S PATENT PUMPS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In reference to your account of Roberts's patent pumps, in No. 1787, will the ingenious inventor favour your readers with the depth from which the water was drawn (or, more accurately, the length and diameter of pipe from the water to the pump), and the length and diameter of pipe to the tank into which the water was discharged; also the number of single strokes per minute, area of each piston, and length of stroke. Without these data no correct estimate can be formed of the absolute value of the invention.

I am, Gentlemen, yours, &c.,

ENQUIRER.

November 9, 1857.

[We have no desire to discourage the inventor from giving the information here asked for; but no one who has a knowledge of the "absolute value" of Downton's pump, and also of the value of Roberts's, as compared with it, can have much difficulty in approximating pretty nearly to the absolute value of Roberts's.]

THE WAVE-LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I very much regret that I have made two mistakes in my letter to you inserted in No. 1787. In the first column of page 439, the 26th line from the bottom, instead of "880 feet per minute," read "2 miles an hour;" and in the last line but one of the same column, erase "440 feet per minute or."

Your correspondent, "C. W. M.," appears to have overlooked No. 1 in my diagram, page 319, No. 1782. When he says, "I have never seen a cutter much sharper than Mr. Moy's bluffest lines," he evidently refers to No. 2 in the same diagram.

I can assure "C. W. M." that I am prepared to do something more than delineate trochoids, and that I did not insert even that brief reference to three deckers in my paper without considering the necessity of carrying bow chasers.

I am, Gentlemen, yours, &c.,

T. MOY.

IMPROVEMENT IN PANORAMIC REPRESENTATION.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I think that it would be an improvement if something of this sort were adopted in lieu of the ordinary motionless picture placed around circular buildings, or that passing by means of rollers behind a framework placed before the audience, which form our present panoramas.

There should be two paintings, to represent both sides of a scene, each of which should enter a circular building by the same vertical aperture, but proceed along each side of the wall, of course in different directions, and vanish in the same manner. They should both wind on and off rollers placed behind each aperture in the usual way. Thus, I think, sitting with our face to the unwinding rollers, we should have a good representation of the way in which landscapes appear to open to our view, and likewise by turning round, how such seem to close upon us. The paintings might be caused to traverse the walls by means of small rings arranged to slide upon bars, or some such contrivance.

I am, Gentlemen, yours, &c.,

J. A. D.

THE LETOSCOPE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I propose to give this name to an instrument which I have invented for ascertaining and comparing the intensities of light, whether natural or artificial, which I will describe.

It is a box about nine inches long and three square, made of wood, or better perhaps of tin, having one side acting as a lid, with screens like those of a portable camera obscura. This should be divided by partitions into thirty-six spaces, each of course one quarter of an inch. The partitions should be of thin tin, and painted black, as should also the interior of the box. An aperture of about one sixth of an inch diameter should pass through the centres of the tin plates, forming the partitions and the end of the box next to the hinges of the lid, when the simple, but I think efficient, apparatus will be completed.

The light, on entering, will fall upon a certain number of plates, according to its strength, which may be seen by raising the lid. It seems to me clear that the light will fall with full force upon the nearest surface, and consequently diminish gradually from the loss which must naturally take place. Hence the rationale of this contrivance. It is hardly necessary to state that the width apart of the partitions is independent of their number, and I may say that it might possibly be better to halve the width of those towards the end of the box, or gradually lessen them; but to this there is the objection that so many surfaces would destroy a considerable amount of transient light.

I am, Gentlemen, yours, &c.,

J. A. D.

THE IRON QUESTION.

To the Editors of the Mechanics' Magazine.

Gentlemen,—The very interesting account of the present state of Mr. Bessemer's process for converting cast into soft iron without puddling, which recently appeared in your Magazine, induces me to request you to publish the following suggestions:—Is it not possible to mix with the air furnishing the blast some deoxidizing gas; or, after the impurities, the silicon, &c., have been removed by the blast, as in Bessemer's process, to apply another blast to effect the reduction of the oxide of iron disseminated through the molten metal? Would not the oxide of carbon effect this? and could not the oxide of carbon produced in blast furnaces be applied to this purpose?

I am, Gentlemen, yours, &c.,

J. V.

IMPROVEMENTS IN BLOWPIPES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—There is no denying that the use of the ordinary blowpipe is very injurious; which being the case, I much wonder that some contrivance for effecting the same result is not commonly used. I would propose that a couple of condensing cylinders in communication with this instrument be fixed upon a small stand, having such or similar apparatus for condensing as is used for the exhaust cylinders of an air pump. It could not be but effectual, and would, doubtless, spare many lives, while the expense would only be at the set out, and that but trifling.

I am, Gentlemen, yours, &c.,

J. A. D.

Nov. 2, 1857.

MISCELLANEOUS INTELLIGENCE.

Ploughing by Steam.—The Highland and Agricultural Society of Scotland this year offered a premium of £200 for a steam plough which should satisfy certain conditions. The only plough that entered into competition was that of Mr. John Fowler, Cornhill, London (described in our first article this week), which was tried for several days both at Stirling and Edinburgh; but in one or two instances the day's work was interrupted by accidental derangements of the machinery. After much consideration the judges have awarded the premium to Mr. Fowler, considering that, though his steam plough may not have satisfied all the conditions laid down by the society, the quality and amount of the work performed have been such as to entitle him to all the encouragement and support which their award is calculated to afford.

MANUFACTURE OF IRON AND STEEL.—We understand that the Ebbw Vale Company are progressing favourably with their preparations for the manufacture of cast-steel of good quality at a low price; and have, in their desire to accomplish their object in the most satisfactory manner, acquired a large number of the patents which have been taken out within the last two or three years. The whole of Mr. Martien's inventions have become their property, as has that of Capt. Uchatius, and several of the most valuable processes patented by Mr. R. Mushet. Uchatius's invention has alone been yet proved to be of practical value, but this, no doubt, arises from the others not having had a fair trial. It is, we believe, intended to thoroughly test the whole, and we may then hear more favourable accounts both of Mr. Martien's and Mr. Mushet's discoveries. — *Mining Journal.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

MURRAY, C. H. *An improved construction of chain pump.* Dated Feb. 23, 1857. (No. 530.)

To make chain pumps more efficient and simple in construction than heretofore the patentee proposes to adopt an arrangement that will prevent their liability to choke, and yet enable them to act on the suction principle throughout the whole lift. He effects this object by the employment of a series of flat-lifting plates attached to travelling chains so that they may be made to work in a vertical tube. These plates are hinged at one edge by a pair of endless chains which work over pulleys mounted at the top of the vertical tube, and the outer edge of the plates is supported by supplementary chains pendent from the main chains. The lifting plates are, therefore, free to turn upon their hinges when required. This they will do when moving over or under the chain pulleys, but when passing up the vertical tube they will stand across it.

MAISSAIT, J. H. M. *Improvements in dibbling machinery for depositing grain and manure.* Dated Feb. 23, 1857. (No. 531.)

The principal feature of the improved machine is an impressing or dibbling roller, which effects the deposit of the seed and manure simultaneously.

KOCH, A. *Improvements in machinery for breaking and scutching flax, hemp, and other fibrous substances.* Dated Feb. 23, 1857. (No. 532.)

Three parallel blades are fixed to a frame, and across them the fibrous substance is placed to be beaten by moveable beaters. Between each set of fixed blades two moveable parallel blades work. The moveable and fixed blades are of a triangular section, and of hard wood. In order to give to the moveable blades a quick and powerful action in their descent, vulcanized india rubber or suitable springs are applied to each of the moveable frames of blades.

BARNETT, G. *Improvements in fasteners for parts of garments.* Dated Feb. 23, 1857. (No. 534.)

In order to fasten sashes, belts, &c., fasteners are made somewhat similar to a buckle, but modified in various ways.

MILNES, J., and W. THOMPSON. *Improvements in looms for weaving.* Dated Feb. 23, 1857. (No. 535.)

This relates to looms in which moveable or change shuttle boxes are employed. The patentees apply at each end of the batten of the loom shuttle boxes, having each two or more compartments, either of which may be brought opposite the shuttle race by sliding the box horizontally in the direction from front to back of the loom, or *vice versâ.* The shuttle boxes are governed by a pin barrel or other pattern surface, &c.

LATRUFFE, C. F. *Improvements in heating apparatus.* Dated Feb. 24, 1857. (No. 536.)

These consist in a contrivance whereby the heat of stoves, calorifères, &c., may be more usefully employed, and are based on the property possessed by air of decreasing in specific gravity as it increases in temperature. The invention cannot be completely described without engravings.

BROOMAN, R. A. *Improvements in underskirts or petticoats.* (A communication.) Dated Feb. 24, 1857. (No. 537.)

This consists in forming petticoats of a flounced skirt, and with flounces of plaited vegetable fibre attached thereto, such fibre being encased (either with or without strips of steel) in a textile material.

BETTELEY, J. *Improvements in machinery for lifting and working anchors, cables, and other weights on ship-board.* Dated Feb. 24, 1857. (No. 539.)

The patentee adds the power of one capstan to another capstan or capstan spindle by means of wheeled gearing at the foot of them, one having a driving wheel on it and the other a pinion. The capstan or capstans he turns by hand spikes set at an angle so as to pass one over the other. He also uses dragging wheels and endless chains in the place of the wheels and pinions. He also works a perpendicular spindle similar to a capstan spindle, having a dragging wheel on it for the purpose of attaching the cable and heaving it on board. Other modifications are included.

ROBINSON, J. *Improvements in the stages used in green-houses and hot-houses.* Dated Feb. 24, 1857. (No. 540.)

The stage for a green-house or a hot-house is made to slope parallel with the slope of the top of the house, and the peculiarity of the invention is that the stage and plants thereon may at any time be raised or lowered, and retained at any desirable distance from the top of the house. The stage is suspended on weighted cords, passing over pulleys, in order that it may be counterbalanced.

PARKES, A. *Improvements in separating tin from tin-plate scrap, and tin or zinc from other surfaces of iron.* Dated Feb. 24, 1857. (No. 541.)

To separate tin from tinned iron the patentee treats it with strong sulphuric acid (preferring it concentrated). He prefers to apply heat.

JOHNSON, J. H. *Improvements in fastenings for dress and other purposes.* (A communication.) Dated Feb. 24, 1857. (No. 543.)

The fastening consists of a hooked plate attached by a band to the article to be fastened. This hook takes into a corresponding holding plate. An incline is formed on the back edge of this plate, to facilitate the hook sliding up it when the fastening is connected. A small button or a recess is fitted, whereby it is easily fastened or unfastened.

MCCALLAN, G. *Improvements in air and water discharge apparatus for steam pipes.* Dated Feb. 24, 1857. (No. 544.)

This apparatus is so arranged that so long as cold air flows into a receiver from the steam pipe, this air finds its way out through an outside air valve, but when steam begins to flow in, its heat acting upon the air contained in the tubular steam of the air valve causes the valve to rise upwards and close the air-escape. In this way, whilst any air from the steam pipe flows easily away, no steam can ever be lost. As water pours into the receiver from the steam pipe, it accumulates until its level is high enough for it to float the ball, open the equilibrium valve, and discharge the water. The sinking of the ball-float closes the valve.

MITCHELL, A. *Improvements in harpoon guns.* Dated Feb. 24, 1857. (No. 545.)

This relates to harpoon guns used by whale fishers, and consists of certain arrangements whereby the elevator bar, used for giving the gun its elevation, is made adjustable, so as to suit for different distances in firing.

WOOD, W. *Improvements in machinery or apparatus used in the manufacture of carpets and other pile fabrics.* Dated Feb. 25, 1857. (No. 547.)

This relates to the weaving of fabrics having a terry or pile produced on loose wires, and consists in making the heads of the said wires of such a shape that a hook or holder may be connected, released from, and pass through them as required. It also comprises other collateral features.

WOOD, W. *Improvements in machinery or apparatus used in the manufacture of carpets and other pile fabrics.* Dated Feb. 25, 1857. (No. 548.)

This relates to transferring the wire from the withdrawing to the inserting instrument, when loose wires are used. The patentee uses two or more instruments, but makes each of them both draw out and put in a wire alternately, or in succession, and without any transfer of the wire, by means of a compound instrument made to move to and fro, so that in moving from the fabric a wire is withdrawn, the same wire being re-inserted after the compound instrument has been moved to bring the end of the wire towards the open shed. Although two or more instruments are in action, the wire is not transferred from one to the other; therefore no time is lost, or liability to miscarriage incurred.

FENTON, J. *An improved method of connecting the feed pipes of locomotive engines and tenders.* Dated Feb. 25, 1857. (No. 549.)

The patentee uses a tube, the ends of which are placed within larger tubes. Over the tube and within the sockets he places a flexible or elastic ring, the cross section of which is circular, so that it may have a rolling motion when the pipe moves to and fro in the sockets, or the sockets upon the pipe. He also places flanges or collars either upon the pipe or sockets, in order to regulate the length of motion of the ring. A part of each end of the connecting pipe between the flanges is coned, and the flange adjoining the cone is curved, so that when an extra pressure is applied the ring rolls or slides off the parallel on to the curved and conical part, thereby tightening the ring, and preventing leakage.

NEWTON, W. E. *Improved machinery for making preparings from waste silk, cotton, wool, flax, hemp, and other fibrous materials.* (A communication.) Dated Feb. 25, 1857. (No. 552.)

This consists in an arrangement of mechanical parts forming an apparatus which the inventor terms a slivering machine. This is applied in front of the drawing roller, and forms part of the drawing apparatus. It requires engravings to illustrate it.

DEGRAND, L. E. O. *Certain improved lenticular glasses for lighting and reflecting or refracting.* Dated Feb. 25, 1857. (No. 553.)

This relates to the production of lenticular glasses formed with striated, corru-

gated, or waved surfaces, the object being to construct lenticular glasses of corrugated glass, and with corrugations arranged so as to produce any required result of refraction or reflection of light or heat. The specification gives drawings of the method of adapting the improved glasses to the construction of lamps, lanterns for lighthouses, &c.

JOHNSON, J. H. *Improvements in apparatus or instruments for measuring distances and elevations.* (A communication.) Dated Feb. 25, 1857. (No. 555.)

This relates to an instrument for measuring distances by optical observations alone, without the aid of a measuring chain or tape. It consists of a rectangular hollow box, which carries at each end a telescope, one of which is fixed at right angles to the axis of the box, so that it cannot be moved horizontally separately from the box to which it is attached. The opposite telescope turns horizontally on a pivot, so that its line of sight intersects the line of sight of the fixed telescope at any desired distance from the instrument.

JOHNSON, J. H. *Improvements in carding-machines.* (A communication.) Dated Feb. 25, 1857. (No. 556.)

This relates to modifications in the mechanism which supplies the fibrous material to the main carding drum. A constant vibrating motion in the direction of its axis is imparted to the intermediate roller placed between the feeding rollers and the main drum. Or this longitudinal motion may be imparted to the feed rollers, to the endless feeding band, or to the entire table which supports the feeding mechanism.

PICCIOTTO, M. H. *Improvements in preparing flax, hemp, and other fibrous substances.* Dated Feb. 25, 1857. (No. 557.)

The patentee claims—1. Flattening the raw or green stalks of hemp, &c., before passing the same through fluted rollers for trituration. 2. The arrangement of a machine for scutching and cleaning hemp or other long fibres, in which the fibres are struck or beaten on both sides against the air, and held in the proper position and centre by two counter currents of air. 3. The treatment of flax stalks, &c., with hot water, with or without alkaline mixture, combined with pressure and washing, so as to effect without fermentation, and by mechanical action, the removal of the gummy and albumenous substances and epidermis, and the consequent separation of the fibres. 4. The treatment of retted or fermented flax stalks, with a diluted solution of carbonate of soda or potassa.

GODET, A. *Improvements in reefing sails.* Dated Feb. 25, 1857. (No. 559.)

This consists in reefing sails without sending men out on to the yards. The sails have attached across them strengthening bands, to which are fixed ropes which pass up to the yard, and thence through blocks or rings to the mast, and are then hooked on to ropes which pass through blocks to the deck. To reef the sail, these ropes are pulled upon until the first strengthening band on the sail comes up to the yard, and it is held there by a fastening apparatus which passes through rings fixed to the yard. For other reefs the process is repeated.

SHAW, T G. *An improved thrashing and winnowing machine, which he calls flail-thrashing machine for corn and other grain.* Dated Feb. 26, 1857. (No. 561.)

This machine cannot be described without engravings.

BRUTON, C. sen., C. jun., F. J., and S. R. *An improved azure blue for domestic purposes.* Dated Feb. 26, 1857. (No. 566.)

The inventors mix oxalic acid with Prussian or Chinese blue in about equal quantities. To every four parts of this mixture they add about one part of water, which they heat or boil for a short time, and, when cold, dry it, and then pulverise it ready for sale as a powder, or dilute it with water and sell it in a liquid state.

EDWARDS, J. S. *The preparation and novel application of a certain foreign fruit or vegetable, as an article of food, confectionary, or to be used in brewing or distilling, or for the manufacture of sugar and gum.* Dated Feb. 26, 1857. (No. 567.)

The vegetable here alluded to is the Carob or Locust Pod, sometimes called St. John's Bread. The patentee dries the bean pod, grinds it with edge runners, sifts the meal to remove all the stones and husks, after which he may or may not mix with the meal a portion of a certain syrup or sacha. He then reduces the mixture or the meal to a fine powder, which may be used for making a beverage, or made up into cakes to be used as chocolate, or various articles of confectionary.

MILLS, W. *An improvement in the action of upright pianofortes.* Dated Feb. 26, 1857. (No. 568.)

The escapement is arranged to work at the upper part of the sticker, and so that when the sticker is raised by putting down the key, the upper part of the escapement puts the hammer in motion, and is caused to escape from a notch or step in the hammer butt by a projection on the escapement coming in contact with the escapement button.

HODGSON, B., and J. CARTER. *Improvements in looms for weaving Brussels carpets and other terry fabrics.* Dated Feb. 26, 1857. (No. 569.)

In order to introduce and withdraw the

wires employed when weaving terry fabrics, a double volute apparatus is applied to a loom. The volute acts on a slide, and moves it to and fro, and motion is thus given to an apparatus arranged to take hold of a wire, then to move out with it from the selvage of the cloth, then to carry it back towards the reed of the loom, then to move the wire into the open shed, then to leave hold of the wire and to go forward to take hold of, and in like manner to draw out another wire. The volute acts on friction rollers carried by axes fixed to the slide. The volute receives motion from the main shaft of the loom.

CASSAIGNES, V. *Improvements in the manufacture of metallic pens and pen-holders.* Dated Feb. 26, 1857. (No. 570.)

These cannot be described without engravings.

MACFARLANE, W. *Improvements in moulding or manufacturing cast-iron pipes.* Dated Feb. 26, 1857. (No. 571.)

Claims.—1. The simultaneous formation of the moulds and cores for casting pipes, the said moulds and cores being formed in a vertical position for the purpose of casting pipes on end. 2. The arrangement of machinery described for forming the moulds and the cores. 3. Making the moulds and cores for cast-iron pipes with cellular cavities and longitudinal or other openings, for the purpose of venting the mould and core. 4. Moulding cast-iron pipes in a horizontal position, in which the casting is partially uncored by means of the expansive force of steam or gaseous matters. 5. Forming horizontal moulds for casting pipes, in which the pattern of the pipe serves the twofold purpose of forming the moulds and the cores. 6. The use of thickness pegs of one uniform thickness, instead of nails or chaplets, to the cores of pipe moulds, and of a bearing plate or core strap for holding a thickness peg, and by means of an adjustable screw or double incline binding stud in the moulding box acting upon the thickness peg, the core is kept in its proper position during the process of casting. 7. Moulding bends, elbows, branches, heads, and other pipe fittings, in which the pattern is made to form the mould and the core. 8. Moulding cast-iron pipes by the agency of moulds and cores which have not been subjected to the action of heat.

DAVIES, D. *An improvement in steps for carriages.* Dated Feb. 27, 1857. (No. 574.)

This consists in placing a stop upon an arm or bracket which turns upon a central pin or axis when acted upon by a connecting link attached to the carriage door. This connecting link is pivoted at one end to the door of the carriage, and at the other end to a point in the step eccentric to the axis on which it turns, so that when the carriage door is shut the step lies beneath the body of the carriage, front inwards; but on opening the door the connecting link draws the step half round, and causes it to project in front of the doorway ready for use. The closing of the door returns the step to its original position beneath the carriage.

ROBERTSON, W., J. G. ORCHAR, and J. MENZIES. *Improvements in machinery or apparatus for winding yarns or threads.* Dated Feb. 27, 1857. (No. 575.)

This relates to apparatus comprehending a simple self-acting contrivance for varying the rotary speed of the bobbin or other detail receiving the yarn or thread, so as to give it a uniform surface velocity throughout the winding. It consists essentially in causing the increase of yarn or thread upon the bobbin to act on a fixed stop, so as to shift the bobbin, and thereby cause the driving action to take effect on the spindle at various distances from its centre or axis.

MUCKLOW, E. *Certain improvements in apparatus to be employed for the purpose of cooling and evaporating.* Dated Feb. 27, 1857. (No. 577.)

The object here is the cooling of such liquids as require to be evaporated whilst at or below a boiling temperature, particularly sugar, dye extracts, &c. Above the vat or cistern containing the liquor to be evaporated is placed a wince or rollers; upon these rollers are placed endless bands of cloth, which hang down into the vat, nearly touching the bottom, the outer surfaces of which are doubled or ridged, and ribs of wood, &c., having inward bevelled or concave surfaces, forming a kind of bucket, are secured on each side of the doubles or ridges from selvedge of the cloth, so that when a rotary motion is given to the rollers the lagged cloth will raise the hot liquid from the cistern or vat, and after exposing it to the air to cool, return it again to the vat after passing over the wince or roller.

THORNTHWAITE, W. H. *Certain improvements in barometers.* Dated Feb. 27, 1857. (No. 579.)

This consists—1. In making barometer tubes, or that portion thereof employed for observation, with a flattened bore. 2. In employing a coating of enamel on one side of the glass tubes of barometers. 3. In graduating divisions upon flattened glass tubes of barometers, in lieu of, or in addition to, the ordinary graduations which are upon the stand to which the glass tube of the barometer is affixed.

DRAPER, S. *Improvements in apparatus for retarding and stopping carriages on railways, and in cocks or taps used for such and other purposes.* Dated Feb. 27, 1857. (No. 581.)

These improvements are applicable when using hydraulic and pneumatic apparatus. Each carriage is arranged with a hydraulic cylinder and ram in a vessel containing water. The pump to the hydraulic cylinder is put in motion by means of eccentric or cam surfaces on one of the axles of the carriage. The ram of the hydraulic cylinder acts on a lever which in its turn acts by connecting rods on the several breaks of the carriage.

NEWTON, A. V. *An improvement in springs for railroad carriages and other uses.* (A communication.) Dated Feb. 27, 1857. (No. 582.)

This consists in combining with one end of a steel volute spring an elastic cushion, placed and held in contact with the inner end of such spring, so that during the play of the spring, the cushion shall at all times be in contact with the end only of such spring, and by such contact prevent the vibrations which would be otherwise induced in the spring.

NEWTON, W. E. *Improved valve gear for reciprocating steam engines whose power is applied directly by the piston without employing a rotary shaft.* (A communication.) Dated Feb. 27, 1857. (No 583.)

This valve gear consists of an oscillating yoke provided with grooves or cam pieces, in or against which work travelling pieces, or rollers, mounted on or attached to the piston rod, and which, by acting upon the oscillating yoke depress the ends thereof alternately, and by means of a vertical arm and connecting rod work the slide valve of the steam engine.

HEALE, E., and M. A. *The treatment of vegetable and other substances.* Dated Feb. 28, 1857. (No. 585.)

Vegetable matters are prepared by placing them in a vessel from which the air is first exhausted, and afterwards admitting rarefied air, which, upon coming in contact with the exhausted vegetable matter, causes it to become thoroughly desiccated. By this process the aroma and essences of the plants remain fixed, thereby increasing their value, whilst the process being conducted in the dark, the phosphates contained will not be acted upon by the light.

HARRISON, C. W. *Improvements in obtaining light by electricity.* Dated Feb. 28, 1857. (No. 588.)

This relates—1. To the preparation of electrodes for producing light. One improvement consists in placing pieces of material in gas retorts, or in tubes connected therewith, for receiving a deposit of gas carbon, which may be condensed to form electrodes. Hollow cylinders of carbon are formed by passing a current of coal gas through a chamber which is traversed by metal tubes joined with a furnace, the flaming and heated air of which are drawn through the tubes. When these attain a red heat they gradually become coated with a dense form of carbon. Pencil or solid carbon electrodes are formed by suspending small rods or pencils of wood charcoal upon a frame of iron which is placed within a heated gas chamber or retort, where it will be subjected to a high degree of heat. The charcoal is thus rendered hard and lasting. The tubes and pieces remain exposed to the action of the gas until they are coated to the desired thickness, and they are then cut to form. Another improvement consists in the use of electrodes of spongy or powdered metals prepared by compression into shape, or first compressed and then cut to shape. Coloured lights may be obtained by combining suitable metals in this way; plumbago and zinc—three parts of the former to one of the latter—form a positive electrode for producing a brilliant white light. 2. To an arrangement of electrodes, which dispenses with the necessity of bringing the electrodes together continually as they are consumed. The patentee employs a cylindrical electrode, and, placing it on an axis in the direction of its length, imparts to it a rotary as well as a horizontal or onward motion in the line of its axis. Opposite to the circumference of this electrode he places a pointed one. This latter traces a spiral path over the other. 3. To a mode of maintaining a very uniform distance between a rotary disc, positive electrode, and a point or pencil negative electrode. This consists principally in keeping in contact with the periphery of a rotary disc electrode a roller or pulley connected with a pendant or sliding pencil electrode; the negative electrode advances without causing sudden fluctuations in the light. 4. To improvements in producing a succession of flashes or streams of light. The inventor employs for the purpose electro magnets to effect a reciprocating or vibrative motion in electrodes; and he prefers using the metal mercury for the positive electrode in producing flashes or streams of light. Another mode consists in the employment of a coil of conducting medium, a vibratory motion being given on the passage of the current to electrodes arranged as last described. This part of the invention is very suitable for lighting marine buoys, through submarine wires. 5. To the introduction of an induction coil, in connection with a primary current, and one improvement consists in giving any required motion to electrodes by the operation of the primary current, and producing light by means of the induced current above. 6. To combining the currents generated in an inductive coil with

currents of magneto-electricity produced by the motion of a conductor within the action of permanent magnets, so as to increase its effect in producing light. 7. To a mode of obtaining the electric light by which signals are effected, by the use of electrotomes, by which the current shall be let on both at short and at long intervals. At each passage of the current a distinct flash of light is produced, and this may be taken to denote an unit. 8. To indicating to vessels, by flashes of electric light, the depth of water in harbours or on banks, by means of a float within a tube, which, by suitable mechanical contrivances, as it rises and falls, calls into operation different electromes, and these by completing the circuit of the current give rise to flashes of light, in number according to the depth of water in feet.

WILSON, G. *Improvements in weaving.* Dated Feb. 28, 1857. (No. 590.)

This relates in some degree to improvements upon a previous patent of the patentee, and has reference to looms in which two or more shuttles are used, and consists of arrangements whereby two or more picks may be effected from one side of the loom in succession, so that, in weaving harness muslins, for example, in which the pattern is produced by the weft, two weft threads of different thickness being used, a single shot of either of the threads may be thrown in at any time to suit the pattern. In weaving corded checks in the power loom, the effect of the cord is generally produced by throwing in a number of weft shots whilst the warps are kept open at the same shed; but by means of the present improvements a single cord of thicker material than the ordinary weft may be thrown in at any point to suit the pattern.

M'CONNELL, J. E. *Improvements in railway breaks.* Dated Feb. 28, 1857. (No. 591.)

This invention was described and illustrated at page 337 of No. 1783.

TYLER, H. W. *Improvements in the permanent way of railways.* Dated Feb. 28, 1857. (No. 592.)

The object here is the securing of the bolts by which the ends of railway rails are bolted to fishing plates, and also bolts and nuts which are employed for fixing railway rails to their chairs, so as to prevent them from becoming loose. For this purpose the patentee employs bolts and nuts in which the heads are made smaller on the insides than on the outsides; and he employs a plate having notches cut in it to fit the smaller parts of the heads of the bolts, and when they are screwed up he drives this plate down over the smaller parts of the heads.

BROOMAN, R. A. *An improvement in the manufacture of sulphate of soda.* (A communication.) Dated Feb. 28, 1857. (No. 595.)

Instead of decomposing chloride of sodium by sulphuric acid, the inventor exposes this salt to a current of sulphurous acid, which decomposes the water in the salt. The hydrogen combines with the chlorine to form hydrochloric acid, and the oxygen transforms the sulphurous into sulphuric acid, and the sodium into protoxide of soda. These two bodies, reacting upon each other, form sulphate of soda.

CUNNINGHAM, H. D. P. *An improvement in sails, and in the reefing and furling of sails, and setting and taking-in of sails.* Dated Feb. 28, 1857. (No. 596.)

This refers more especially to sails which are reefed, furled, &c., by being rolled upon a yard, but is applicable also to all descriptions of sails, and is intended to prevent the wear of the sails at parts subjected to friction. It consists in introducing into the sail at such parts a stout material such as gasket, sinnet, or sword matting; or the material may be placed upon the canvas forming the sail.

JENNENS, T. H. *A new or improved manufacture of rollers or cylinders for printing fabrics.* Dated Feb. 28, 1857. (No. 597.)

The object here is to economize the material of which such rollers or cylinders are usually made, namely, copper or alloys of copper, and this the patentee does by forming the bodies of paper or papier-maché, either by pressing them in moulds, or by winding paper coated with paste around a parallel or slightly tapered mandril, and which mandril he purposes to be of the size of the spindle on which such roller or cylinder would be placed when required in printing fabrics.

MURPHY, J. *Improvements in securing screw-nuts on their bolts and bolts in plates.* Dated Mar. 2, 1857. (No. 598.)

Each bolt is to be grooved transversely through the threads thereof, and the nut or plate grooved in like manner with one or any number of grooves tapped to receive a screw or plain pin, which is screwed in with it.

WRIGHT, S. *Improvements in gas-regulators.* Dated Mar. 2, 1857. (No. 599.)

This regulator consists of a chamber or reservoir divided into an upper and lower compartment by a flexible diaphragm; an inlet and outlet orifice communicate with the lower compartment. To the flexible diaphragm is attached a central spindle, working vertically through an aperture in the upper part of the reservoir; to the lower end of this spindle is attached one end of a flexible and moveable flap, the other end of

the flap being secured to the inlet elbow. When the flexible diaphragm is acted upon by an extra pressure of gas, it rises, and brings the moveable flap in contact with the inlet orifice, so as to close, or partially close, the opening, and thereby diminish the quantity of gas admitted. When the extra pressure ceases, the diaphragm is lowered, and enlarges the inlet orifice, so that the supply of gas to the burners is regulated and maintained uniform under every variation of pressure in the main supply.

PEDDER, W. *Certain improved methods of strengthening metallic and other structures.* Dated Mar. 2, 1857. (No. 603.)

This invention was described and illustrated at p. 274 of No. 1780.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

LAUROT, L. *Separating the different solid fatty (acides gras) acids from the liquid fatty ones.* Dated Feb. 23, 1857. (No. 533.)

This consists in separating solid fatty acids from liquid fatty acids by adding to a mixture of the two a proportion of lime or other alkaline earth or metallic oxide sufficient to combine with the solid fatty acids, which, when so combined, are easily separated from the liquid fatty acids.

HAWKS, S. W. *Improvements in railway chairs.* Dated Feb. 24, 1857. (No. 538.)

This consists in forming the chair in two separate side pieces, one fitting on each side of the rail, and bolts being passed through holes in the rail and the two side pieces. These side pieces are also formed with a foot so as to rest on a bottom plate, to which they are secured by bolts passing through the bottom plate into the sleeper or foundation.

PULLAR, J. and L. *An improvement in the manufacture of umbrellas and parasols.* Dated Feb. 24, 1857. (No. 542.)

This consists in the application of a peculiar fabric composed of weft of spun silk waste and warp of cotton or linen yarn. The warp yarns are put through a solution of aluminous soap, to give a resisting power against moisture. The fabric having been woven the projecting fibres are shaved or singed off, and the fabric is then subjected to the action of a dash-wheel, and passed through a solution of gum, and over rollers placed above a charcoal fire; after which it is exposed to the atmosphere, and then passed over hot rollers to obtain lustre.

THORNTON, J. *Improvements in the manufacture of bricks, tiles, and tubes of earthenware.* Dated Feb. 24, 1857. (No. 546.)

The machinery here employed consists of a vertical clay working cylinder or pug mill, fitted with revolving knives which force the clay supplied at the open upper end of the cylinder downwards, and out at the lower end into a duplex series of moulds placed beneath.

MEAD, J. and G. *Improvements in metallic packing boxes or cases.* Dated Feb. 25, 1857. (No. 550.)

This relates to boxes or cases for packing bullion, &c. Sheet metal is cut to the required size, and folded in one piece to form the body of the box or case, and secured down one side with a lap joint or rivets. Within one or both ends is a metal rim or ring to strengthen the same, and the edges of the metal may be turned outwards, so as to permit the head piece to slide over it by having its edges lapped to correspond thereto; or the heads may have their edges turned upwards and be inserted in the body to lap inwards. The edges are hammered down close.

PIAUD, L. *Improvements in ventilating and preventing inundations in coal mines.* Dated Feb. 25, 1857. (No. 551.)

This consists—1. In placing in the shafts of coal mines a main feed pipe, furnished with a piston, worked by the steam engine of the mine, or otherwise. The pistons or pump is used to supply the mine with pure air by means of branch pipes, forces, or ventilators, &c., in connection with a circular and other galleries. 2. In preventing inundations in mines by a gallery, which acts as a recipient for the water from intersecting galleries.

SCHWEDERSKY, C. *Improvements in floating ships or vessels.* Dated Feb. 25, 1857. (No. 554.)

The apparatus consists of iron screws, which are made fast in a wooden post and work in any direction required, so that a sunken or water-logged ship can be slowly raised and moved forward.

SPENCE, J. *An improvement in the manufacture of artificial coral.* Dated Feb. 25, 1857. (No. 558.)

This consists in forming the articles of vegetable ivory, and dyeing them with a composition of lac dye, cochineal, and a solution of tar, in which the articles are boiled, and are afterwards washed in a strong solution of soap.

GLEW, J. H. *An improved method of fastening ladies' and gentlemen's boots and shoes.* Dated Feb. 26, 1857. (No. 560.)

A steel-jointed spring with catches for fastening is inserted in the boot or shoe.

WILEY, W. E. *Improvements in ever-pointed pencil cases.* Dated Feb. 26, 1857. (No. 562.)

This consists—1. In making the propeller flexible, or in connecting it with the propelling mechanism by means of a joint.

2. In the use of a peculiar form of screw in place of the coiled tube or screw ordinarily employed.

EDWARDS, D. O: *Ventilating and removing the products of combustion of fuel, and of respiration from the apartments of dwelling houses and from public buildings.* Dated Feb. 26, 1857. (No. 563.)

The solid finely divided particles of fuel which float in the air and fall upon the contents of rooms, are, by this invention, excluded, and disposed of by means of a separable grate, which may be detached from the hearth at pleasure and cleaned outside of the apartment. The gas and vapours mixed with unburnt particles of fuel are to be carried off through chimneys which are made to open into a "tunnel" or arched passage of brick extending through the diameter of the building from one parapet to another. A regular supply of fresh air from the outside of the building is brought into the apartment through a thickly perforated gauze-like partition a little below the ceiling.

HOY, J., sen. *Improvements in apparatus for distributing sand on railway rails.* Dated Feb. 26, 1857. (No. 564.)

This consists in arrangements of levers and valves connected with suitable sand boxes attached to the train.

HOW, A. P. *Improvements in machinery or tools for drilling and boring.* Dated Feb. 26, 1857. (No. 565.)

This consists in constructing ratchet drills so that the teeth in the ratchet wheel may be acted on alternately by two pawls which take into the same side of the centre of the ratchet wheel, whereby a continuous rotary motion is imparted to the ratchet wheel and drill stock, by a vibratory motion given to the handles of the stock.

AMIES, N. J. *Certain improvements in machinery or apparatus for polishing and finishing yarns or threads.* Dated Feb. 26, 1857. (No. 572.)

This relates to apparatus designed for drying the yarns by means of heat applied through the medium of the finishing roller or rollers, or heating and drying the said finishing roller or rollers.

ERMEN, G., and F. SPENCER. *Improvements in the manufacture of bands, straps, or belts for driving machinery, and for other purposes.* Dated Feb. 27, 1857. (No. 573.)

This consists in manufacturing bands, straps, or belts, partly of wire and partly of yarn or thread made of fibrous material. The bands, straps, or belts are woven in a loom, and by preference the warps are made partly of wire and partly of yarn or thread, and the weft entirely of yarn or thread.

WILKINSON, W. *Improvements in lighting and in lamps.* Dated Feb. 27, 1857. (No. 576.)

This consists in constructing lamps with a reservoir for gas, so as to form portable gas lamps, which, being charged with gas, give it out by pressure from springs or weights to the burner.

MUCKLOW, E. *An improvement in the manufacture of "alizarine."* Dated Feb. 27, 1857. (No. 578.)

This consists in boiling garancine in an alkaline solution, in place of employing high pressure steam in the treatment of garancine in such manufacture.

FIELD, J. R., J. GOODMAN, and L. GOODMAN. *Certain improvements in trowsers.* Dated Feb. 27, 1857. (No. 580.)

This consists in forming trowsers with a lining of waterproof or other material different from the trowsers, and in so connecting the two together, about the knee and body parts of the trowsers, that the lower parts of the legs thereof can be turned up and down at pleasure.

STUBBIN, F. *Improvements in propelling vessels.* Dated Feb. 28, 1857. (No. 584.)

This consists in passing endless chains over wheels, placed on each side of the vessel. The chains have paddles attached to them, and by means of cogs are carried forward, and their slipping prevented.

DURANT, A. H. A. *Improvements in apparatus for ascertaining and indicating the number of, and distance travelled, by passengers in public carriages, and the fares paid.* Dated Feb. 28, 1857. (No. 586.)

This relates in part to improvements upon a patent of the patentee dated Sept. 8, 1855, and consists in the addition of toothed and other wheels, bolts, and levers, in connection with a bell, for registering the gross number of passengers travelling in a public carriage. Only one bell is employed for registering the highest fare charged, and there is a lever in conjunction therewith for making the necessary deduction between such fare and a lower priced fare.

BRIGGS, J. *Improvements in looms for weaving.* Dated Feb. 28, 1857. (No. 587.)

This consists in adapting to the loose shuttle-boxes of certain looms mechanism in lieu of the ordinary steel-spring. The inventor employs a bell-crank lever, the fulcrum whereof is a pin or stud connected to the upper part of the sword of the loom upon which it acts. At the back of the shuttle-box is a curved spring affixed to one or both end framings of the loom. As the reed moves towards the work in the act of "beating up," the upper end of the bell-crank lever, coming into contact with the curved spring, imparts the necessary pressure to the loose back of the shuttle box.

HORTON, T. *An improvement or improvements in the manufacture of mottled or variegated soap.* Dated Feb. 28, 1857. (No. 589.)

This consists in the use of a double or

divided vessel into the compartments of which the several coloured soaps are put. The apparatus has a double bottom through the lower bottom of which the soap is delivered through a series of holes, the said holes being so connected with the vessels containing the soap that the alternate perforations deliver soap of different colours.

FONTAINEMOREAU, P. A. L. DE. *Improvements in window-shutters.* (A communication.) Dated Feb. 28, 1857. (No. 593.)

In constructing window shutters so that they may be closed outside without opening the window sash, the inventor forms a recess in the wall on each side of the window frame to contain the two shutters when closed. Communication is made from the interior of the apartment with each recess by means of a door formed in the side panel, or framing of the window. The shutter on each side is formed of four parts hinged together, and hung upon hinges fixed to the window frame.

FONTAINEMOREAU, P. A. L. DE. *Improvements in finger and other rings.* Dated Feb. 28, 1857. (No. 594.)

This consists in forming rings for the fingers, or for securing cravats, &c., of two parts, turning on a hinge, and closing by means of a spring.

PARRY, C. J., and W. BRIDDON. *A certain improvement in the manufacture of shirt collars.* Dated Mar. 2, 1857. (No. 600.)

This consists in cutting out the fabric in one piece, and so folding it that when its two extremities are secured together in the centre, the inside and outside of the collar will be formed. The upper edges are then sewn, and a band attached to the lower edges as usual. The front projecting ends or corners of the collar usually sewn will not require it, as the edge will be formed by the fold.

PROVISIONAL PROTECTIONS.

Dated June 30, 1857.

1824. John Talbot Pitman, of Gracechurch-street. An improved method of making carburetted hydrogen gas. A communication.

Dated September 29, 1857.

2498. William Wall White and William Bull, of Saint John's-square, Clerkenwell, merchants. Improvements in rollers applicable for blinds, maps, and other purposes.

2502. Richard Williams, of Bishop's-road, Victoria-park. The manufacturing of soap with materials hitherto not introduced by any person in the chemical combination of various ingredients, when manufactured known by the name of soap.

Dated October 1, 1857.

2524. Sydney Doolan Hamilton, of Great James-street, Bedford-row, solicitor. Improvements in Jacquard machinery. A communication from E. Vincenzi, of Lyons.

Dated October 9, 1857.

2591. Léon Pujol, of Paris, gentleman. Improvements in envelopes and letter-paper.

Dated October 10, 1857.

2597. Claude Nicolas Leroy, mechanic, of Paris. Preventing accidents and collisions on railways.

Dated October 14, 1857.

2622. C. G. Kopisch, of Gibson-square, Islington. Improvements in propelling vessels by means of heated air, without screw or paddle, thereby saving fuel and ship's room.

Dated October 15, 1857.

2637. Robert Glass Balderstone, of Bishop-briggs, N.B., gentleman. Apparatus for cultivating land.

Dated October 22, 1857.

2691. John Bethell, of Parliament-street, Westminster, gentleman. Improvements in machinery or apparatus for trenching, cutting, digging, and cultivating land.

2693. Alexandre Henri Charles Chiandi, of Paris, engineer. Improvements in the manufacture and combustion of certain products of peat, and in the apparatus employed therein.

2695. Thomas Hamilton and James Hamilton, of Glasgow, bobbin turners. Improvements in turning, cutting, shaping, or reducing wood and other substances.

2697. Thomas Cardwell, of Manchester. Improvements in machinery for compressing cotton and other articles.

2699. James Smith, of Bristol, curled hair manufacturer. Improvements in horsehair crinoline for petticoats.

Dated October 23, 1857.

2701. Benjamin Parker, of Clapham, surveyor. Improvements in the permanent way of railways.

2703. Robert Harrild and Horton Harrild, of Farringdon-street, printers' composition roller manufacturers. An improvement in the manufacture of the composition used for printers' rollers.

Dated October 24, 1857.

2705. Felton Charles Kirkman, of Royal-street, Lambeth, civil engineer. Improvements in machinery for winding and unwinding ropes and cables, which is applicable to electric cables for submarine purposes.

2707. John Macintosh, of North-bank, Regent's-park. Improvements in the construction and laying of telegraphic cables.

2709. John Michael Pearson, of Basinghall-street, gentleman. Improvements in the manufacture of coke. A communication.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," November* 10, 1857.)

1815. S. Nye. Improvements in mills for grinding coffee, pepper, spices, and other substances.

1817. J. Pattison. An improved rotary pump.

1824. J. T. Pitman. An improved method of making carburetted hydrogen gas. A communication.

1826. I. C. Clöet. An improved rice and barley-mill.

1827. W. Parsons. Improvements in fastenings for windows and casements, and for other similar purposes.

1828. J. Alsop and E. Fairburn. Improvements in machinery for the manufacture of bread, biscuits, and cakes.

1834. C. J. L. Leffler. Improved machinery for cutting corks, bungs, and other similar articles. A communication.

1839. E. B. Olofson. Improvements in the manufacture of pigments or colours for preserving iron.

1842. T. Moy. Improvements in the mode of working steam engines.

1848. T. Browne. An instrument for ascertaining the true or actual acclivity and declivity of bodies.

1853. J. Lockett and W. Watson. Improvements in machinery for engraving or tracing designs on cylindrical or other surfaces for printing calico and other materials.

1859. H. D. Mears and W. Houlton, jun. An improved seal for railway luggage, vans, and for other purposes.

1862. J. and W. Agar. Improvements in watches, and keys for the same.

1864. R. Gibson, J. Gascoigne, and S. Gibson. Improvements in boilers for generating steam.

1867. G. Cooper. Improvements in safety lamps.

1883. P. H. G. Bérard. Improvements in manufacturing azotic cotton or pyroxyle for photographic and other purposes.

1884. P. H. G. Bérard. Improvements in manufacturing and applying concentrated collodion.

1890. R. A. Brooman. Improvements in connecting carriages and wagons on railways. A communication.

1897. J. Gibbs. Improvements in extracting gold and silver from their matrices and from other substances or materials with which they are combined, mixed, or associated.

1918. T. Vicars, sen., T. Vicars, jun., T. Ashmore, and J. Smith. Improvements in the manufacture of bread, biscuits, and like articles, and in the machinery connected therewith.

1933. D. E. Rugg. An improvement in water-gauges for steam boilers.

1944. P. R. Smith. Improvements in fire-arms and ordnance.

1946. W. E. Newton. Improved machinery for converting old rope or cordage into tow. A communication.

1962. W. H. Gauntlett. Improvements in thermometric apparatus.

1992. G. J. Wainwright and C. T. Bradbury. Improvements in apparatus for diminishing the amount of waste in the use of cops for manufacturing purposes.

1994. W. E. Newton. An improved construction of combined steam boiler and radiator for warming apartments or buildings. A communication.

2154. W. A. Clarke. Improvements in the construction of and mode of applying hot air and vapour baths.

2196. S., J., and T. Bottomly. Improvements in machinery acting upon and in connection with rotary shuttle boxes for weaving checks, plaids, figured and fancy goods.

2242. F. Preston. Certain improvements in apparatus to be applied to the spindles of machines for preparing, spinning, and doubling cotton, and other fibrous materials.

2358. J. Fenton, W. Thomson, jun., and T. Snowdon. Improvements in the permanent way of railways.

2499. W. Bayliss. Certain improvements in the manufacture of chain cable.

2614. C. C. Alger. An improved furnace for smelting iron.

2643. P. Heilmann. Certain improvements in spinning silk, cotton, and other fibrous substances.

2661. T. Massey. Improvements in sounding machines.

2695. T. Hamilton and J. Hamilton. Improvements in turning, cutting, shaping, or reducing wood and other substances.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

1854.

2332. Nathaniel Top, John Holt, and John Partington.
2333. Isidore Alexandre Moineau and Jean Gustave Lemasson.
2343. Joseph Betteley.
2357. Thomas Metcalfe.
2361. George Davis.
2375. David Ferrier.
2382. Henry William Harman.
2384. George Ross.
2393. John Wain.
2394. Eugène Rimmel.
2441. Charles Asprey.
2446. Henry Robert Ramsbotham and William Brown.
2471. William Aristides Vérel.

1855.

73. Edward Hall.

LIST OF SEALED PATENTS.

Sealed November 6, 1857.

348. Nicholas Nomico and George Heyes.
1277. William Hood.
1287. Ernst Ziegler.
1289. Charles William Ramié.
1291. Duncan Morrison.
1315. John Pym.
1335. James Drysdale Malcolm.
1341. William Edward Newton.
1342. William Massey and John Smith.
1344. Thomas Briggs and John Starkey.
1366. James Sharrocks.
1373. Frederic Whitaker.
1382. Richard Archibald Brooman.
1388. George Henry Creswell.
1427. William Clark.
1587. William Edward Newton.
1673. Alfred Vincent Newton.
1677. Thomas Wilkes Lord.

Sealed November 10, 1857.

1324. John Davies Mucklow.
1328. Collinson Hall and Thomas Charlton.
1339. Richard Archibald Brooman.
1343. William Massey.
1347. Edward Eley.
1348. Henry Tolkien and Joseph Middleton.
1362. David Hesse and Max Hesse.
1368. John Carr.
1381. Richard Archibald Brooman.
1389. Joseph Ellis.
1390. Charles Cowper.
1402. Thomas Welcome Roys.
1410. Maria Bounsall Rowland.
1477. Louis Désiré Aubert.
1482. William Hart.
1514. Nathaniel Cox.
1543. George Tingle,
1986. Alfred Upward.
2183. Richard Hoe.
2298. Rudolph Slack.
2424. Richard Watson.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

J. A. D.—There is no novelty in the mode of arranging feathering paddle-wheel floats proposed by you. A little additional care in penning your letters would render some of them more valuable.

W. Crewe.—We forwarded a reply to your inquiries, addressing it as your letter indicated (Upper North-street, &c.), but it was returned to us by the Post-office, as you were not known. Please send your full address.

The letters of "Nauticus," T. C. Haines, J. P. Drake, and B. Cheverton, are received, and some of them will appear next week.

W. Green.—Your letter would be inserted with pleasure, if the statement of Mr. Brunel had not, to a great extent, removed the grounds on which it is chiefly based.

R. Armstrong.—We have not yet resolved what had best be done with your letter, which must have cost you some trouble.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1789.] SATURDAY, NOVEMBER 21, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

DR. GUYOT'S PROTECTIVE MATTING FOR HORTICULTURAL AND AGRICULTURAL PURPOSES.

Fig. 2.

DR. GUYOT'S PROTECTIVE MATTING FOR HORTICULTURAL AND AGRICULTURAL PRODUCE.

Dr. Guyot, of Paris, the proprietor of extensive vineyards, in Sillery, Champagne, has introduced in France, and is now introducing in England, a simple but improved description of straw-matting for the protection of horticultural and agricultural produce, together with a loom or apparatus for manufacturing the same. On a careful examination of the merits of Dr. Guyot's invention, we have found it to be a very valuable one, and most heartily recommend its adoption.

The fabric is composed of a weft of straw, cane, bass, rush, reed, or other similar material, woven into or combined with a warp consisting of two sets of warp threads, each set composed of two wires or stout cords twisted together; and it is manufactured as follows:—The straw, bass, or other material, is cut into even lengths, and spread on a table with a central slot or channel from end to end, where, by means of a comb or reed with conical teeth, the mass is divided into clusters (the thickness of each cluster being according to the space between every two adjoining teeth). The comb is driven into the straw just over the channel. The table is then brought to the weaver, who takes a cluster at a time, and feeds it in a loom or frame, in which the warp, cords, or wires are delivered off in twos from four reels set in the same spindle mounted in the standards of the frame, and are passed through eyes and grooves in plates which act as heddles, being connected by a double escapement or otherwise to treadles, by which they are depressed and brought up again by springs at top, whereby the warp threads are crossed, two by two, alternately, each set being opened to form a shed, through which the weft is introduced. The fabric, as it is woven, is wound off on a beam made to revolve by a weighted lever; the weight also effects the draught and tension of the warp threads, being brought back from the end of its stroke by hand or otherwise; or the beam may be turned, and the warp threads delivered off and opened to form the shed by steam or other power which may be employed to work the frame. Pins may be let in the fabric to fix it in place, or it may be mounted on stakes with cross-pieces, or on swivelled rods, or on adjustable frames, so that the position of the matting may be varied when used for sheltering a plant; or it may be mounted in rollers like a blind to cover conservatories, &c.

The breadth of the fabric varies from about 1 foot 3 inches to 2 feet. The lesser breadth is the better for protecting plants placed in rows or beds, or in hothouses and other like places, and the greater breadth for protecting wall fruits, such as peaches, apricots, &c. The matting is made of any desired length, being rolled up into rolls, like carpeting, as it

leaves the loom or apparatus in which it is woven, and which has been designed specially for its manufacture. It weighs but little, and may consequently be transported with ease, and at a small expense. It may be handled roughly without risk of injury, arranged in any desired form or manner, cut into any required lengths, and, if desired, be re-united again without difficulty. It is so easily applied in the garden or orchard that ten men will, in a single day, fix it over thirty thousand feet of plants, and that so firmly and surely that it will resist the most violent storms to which it may be exposed.

During the last two years, 1856-7, Dr. Guyot applied this matting to the protection of 180,000 feet of vines on his estate at Sillery, and has thus obtained fruit three times more abundant, and much finer than that of the neighbouring vineyards. He has obtained similar success in the cultivation of garden plants and wall fruits on a very large scale. These results have been investigated by scientific and agricultural commissions, and their reports have obtained for him the medals before mentioned, and other rewards in testimony of the value of his invention.

The new fabric, being once introduced into the market, will be used not only for the protection of horticultural and agricultural produce, in corn fields, hay fields, market gardens, kitchen gardens, and orchards, but also for forming light sheds and other inclosures for preserving implements, fowls, swine, &c., for wrapping various materials in, for covering floors in country houses, &c., &c., The modes of applying the fabric to these various purposes, of course, vary, but are in all cases simple and inexpensive.

The engraving, fig. 1, represents the manufacturing loom or apparatus in operation; and fig. 2 illustrates many of the applications to which the improved matting may be applied for out-door purposes.

FOWLER'S AGRICULTURAL STEAM MACHINERY.

(*Concluded from p. 460.*)

Having thus described the various steps which have led to the adoption of Mr. Fowler's present plans, it is only necessary to give the results as ascertained from daily working. In the various experiments, engines have been used of from 8 to 10 nominal horse power, but giving off in reality more than double the nominal horse power. Experience has shown that a speed of rather less than 3½ miles per hour is about the best speed for general purposes, when steam power is employed; at this speed every effective horse power is represented by a draft of 110 lbs., or say 1 cwt.

With regard to the amount of steam power required, when it is considered that in ploughing different sorts of land by ordinary horse labour, a draught of from 2 cwt. up to 8 cwt., and even 10 cwt, is required for each furrow or share, it will be seen that it is impossible to form deductions as to the actual amount of power expended from the mere fact of ploughing an acre of land. Some clue, however, may be obtained for a comparison between the performance of steam power and horse labour; for the experiments with steam power show that, at the speed of 3½ miles per hour, 1½ acres can be done by each furrow or share in a day of ten hours in a field 250 yards long, or two acres in a field 400 yards long, the furrow being 9 inches wide, allowing 5¼ hours and 3¾ hours or 53 and 37 per cent. respectively for hindrances. Now with an engine which gives off by dynamometer measure not less than 24 effective horse power (such an engine as is generally supplied as a 10 horse power engine), about 20 horse power will be available on the plough, or 20 cwt. draught at the above speed of 3½ miles per hour; for it appears from the report of the experiments at the Royal Agricultural Society's adjourned trial at Colchester last year, that 18 horse power of absolute work is done by the plough with an expenditure of 21½ horse power of the engine, although this loss by friction is now considerably reduced by more efficiently supporting the rope, and by the present plan of tackle. The above 24 horse-power engine will therefore exert an available draught of 20 cwt. draught on the plough, being equivalent to rather less than 12 horses each giving off 1⅔ cwt. draught at 1¾ miles per hour, which is a full amount for agricultural horses generally. The engine will thus draw three furrows or shares of the ordinary four horse single share plough used on heavy land, or four shares of the three horse plough used on lighter land, amounting in either case to twelve horse power total draught. Therefore, 1½ to 2 acres being ploughed in a day by each share, the work done in a day of ten hours is 4½ to 6 acres ploughed of heavy land, or 6 to 8 acres of lighter land.

The reduction of cost, however, forms but a small part of the advantages offered by steam cultivation. It is found that heavy land ploughed by steam is left in an almost perfect state of tillage, as it is not

the plough, but the weight of the horses trampling on the land, which causes that solidity of the furrow slice, of which the advocates of rotary cultivation complain. The increased speed of the plough tends also to produce a quicker tillage. Add to these advantages, that, by the aid of steam ploughing, the farmer obtains a perfect command over all the heavier operations of his farm, and can plough the whole of his land during harvest; and it is not easy to exaggerate the importance of this fresh field of conquest upon which steam has just entered. "The estimation in which steam ploughing is held by the farmer may be gathered," says Mr. Fowler, "from the fact that, so pleased were the farmers of Kent with the results of the first three months' working of the steam plough, that they presented the gentleman who introduced it into the county with a testimonial, towards which subscriptions were extensively contributed."

There remains now only to touch upon the wear and tear of the wire rope, on which this method of steam ploughing is dependent. It is found from experience with the steam plough, and from the experience of those who are daily using wire ropes on inclines and railways, that the wear and tear varies considerably with the circumstances in which the rope is placed.

Mr. Fowler has recently made an improvement in the manufacture of wire rope, by the introduction of one steel wire in each strand of the iron wires; the steel wire projecting from the surface of the rope will probably take the greater part of the wear. This improved rope was described in the *Mechanics' Magazine*, at p. 563, of No. 1766.

[Our readers, on perusing the following letter from Mr. Smith, of Woolstone, who has taken a conspicuous part in the application of steam to agriculture, will be good enough to remember that, in the article referred to therein, we expressly remarked that the statements which followed were derived from a paper drawn up by Mr. Fowler.]

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I copy the following paragraph from the first article in your magazine of to-day:

"The first experiments in steam cultivation commenced in the autumn of 1855, when the tackle was arranged with the windlass on a separate frame, and driven by a belt from the driving pulley of the engine, but otherwise differing only in strength from the windlass adopted in 1853 and 1854 for the draining plough. The success of this windlass seemed certain from the first, and it is being successfully worked now in exactly the same form as then made. The first trial of it was with a scarifier, which it worked perfectly, turning it round at the headlands with ease; this being accomplished by attaching both ropes to the front of the machine, and reversing the pull on the ropes." Allow me to remark upon it. This very windlass was contracted for by me in July, 1855, at Carlisle, and manufactured according to my instructions then given. The 17th of December, 1855, was the day I first worked it. I have worked it on my farm very successfully ever since; it is at work to day. The scarifier, and mode of turning referred to, are both separately patented by me. In January, 1856, Mr. Fowler sent his foreman down (under the pretext of putting me up to a few little matters) who remained, and for ten days watched my operations, and reported results to him, after which he attempted steam tillage. I claim the honour of having brought that windlass to bear as the first efficiently applied to the tillage of the soil.

I am, Gentlemen, yours, &c.,

WILLIAM SMITH.

Woolston, Bletchley Station, Nov. 14, 1857.

BROOK AND HIRST'S PATENT FOR FINISHING YARNS AND FABRICS.

WE call the particular attention of those of our readers who are interested in patent matters to the following patent law case, which is a very important one, and establishes a principle that has ever been maintained in this Magazine, viz., that the application of an existing machine to a new purpose is not the subject of a valid patent.

COURT OF QUEEN'S BENCH, WESTMINSTER.

BROOK AND ANOTHER *v.* ASTON.

This was an action in which the plaintiffs, Messrs. Brook and Hirst, woollen manufacturers, at Huddersfield, sought to recover from the defendant, W. H. Aston, woollen manufacturer of the same place, damages for the infringement of a patent granted to the plaintiffs in February, 1856, for "improvements in finishing yarns of wool and hair, and in the finishing of woollen fabrics and piece goods." At the trial, which took place before Lord Campbell at Guildhall, at the sittings after last Trinity Term, the plaintiff obtained a verdict, leave being reserved to the defendant to move this Court to enter the verdict in his favour, if the Court should be of opinion that the plaintiffs' patent was bad. (See *Mechanics' Magazine*, vol. lxvi., p. 608.) The objection to the plaintiffs' patent was that, on the

23rd of November, 1853, they had taken out the same patent, the only difference being that whereas the former patent was applicable only to "cotton and linen yarn," the second patent (that of 1856) was applicable also to yarns of "wool and hair." It was merely the application of an old machine to a new use, which it had been decided was not the subject of a patent. (*Hindmarch on Patents*, 94-95).

A rule having been accordingly granted, Sir F. Thesiger, Mr. Bovill, Q.C., and Mr. Hindmarch now showed cause against the rule; which was supported by Mr. H. Hill, Q.C., Mr. Manisty, Q.C., and Mr. Webster.

Lord Campbell said he thought the defendant was entitled to the verdict upon the ground that there had been no improvement and no discovery. It was the application of an old machine to a new purpose. There was no invention and no novelty in the application. It was merely the application to yarn of wool and hair of a machine which had been applied to "cotton and linen yarn." The mode of application was the same, and the machine was the same. In all the cases where the patent had been held to be good there had been some discovery, some new process, and some advantage, and not the application of an old process to a new use. There was no novelty in the machine, nor in the mode of its application; and therefore the patent could not be sustained.

The other judges were of the same opinion.

Rule absolute to enter the verdict for the defendant.

INCOMMENSURABLE QUANTITIES.

THE RATIO OF THE DIAGONAL OF A SQUARE TO ITS SIDE, AND OF THE CIRCUMFERENCE OF A CIRCLE TO ITS DIAMETER.

BY GENERAL THOMPSON, M.P.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In page 255 of your Magazine of Sept. 12, 1857, is a proposal for measuring the circumference of a circle by what amounts to rolling a circle or cylinder along a plane; evidently founded on a belief that there is some doubt or obscurity on the subject, which the proposed method might be useful in removing.

As this is not a state of information in which it is desirable the mechanics of Great Britain should be landed, you will perhaps allow the following observations.

Among the errors transmitted from early times, one is, that there is a difficulty or mystery about what has been denominated the "quadrature of the circle," or in simpler form, the proportion of the circumference to the diameter. And geometers themselves have been slow in finding out, that there was nothing but the very ordinary phenomenon of what are termed *incommensurables*, with which every school-boy who tries to extract the square root of what is not a square number to his hand, is or may be familiar. The simplest instance of a tangible kind, is in the proportion of the diagonal of a square to the side. If the side of a square be given in figures, all the figures in the world cannot write down with exactness the length of the diagonal; nor if the diagonal be given, the length of the side. But men have not set up a mystery on this, nor thought that the way to settle the question would be to make a very great square and measure the diagonal. Every school-boy knows that he can find the diagonal of any square, however large, within the thousand-millionth part of an inch, or if that is not satisfactory, the thousand-millionth part of that, and so on *ad infinitum*, for as often as he chooses to add nine or ten more decimals to his researches after the square root of 2. And in the same manner with the circle.

I remember, when a boy, thinking I should certainly find the square root of 2 if I had only patience, because I had a conviction it must be somewhere; and I had precisely the same notion on the subject of the circle. A step, therefore, towards familiarizing the rather paradoxical-looking fact, is to show (as being the easiest case) that the square root of any number, not a square number (that is to say, not made by multiplying some number by itself, as are 4, 9, 16, 25, &c.), cannot be expressed with exactness by any congregation of numbers it is possible to make or to conceive; as for instance, not by any vulgar fraction, though the figures in the numerator and denominator should be accumulated to any extent it is chosen to assign. Which may be shown as follows:

Two numbers which when made into the numerator and denominator of a fraction, make a fraction in its lowest terms, are said to be *prime* to each other. And if two numbers are each of them *prime* to a third, —as for instance 5 and 7 are to 12,—then 5 times 7 is also *prime* to 12. A further consequence of which is, that if two numbers are *prime* to each other, as 5 is to 12,—then 5 times 5 is *prime* to 12 times 12; or, in other words, because $\frac{5}{12}$ is a fraction in its lowest terms, $\frac{25}{144}$ is also a fraction in its lowest terms. (Hall's Algebra.)

Suppose, then, that any vulgar fraction in its lowest terms (with hundreds of thousands of figures, if chosen, in both the numerator and denominator) was proposed

as exactly representing the square root of 2. Square it (that is to say, multiply both the numerator and denominator by itself), and the result will be a fraction in its lowest terms; and this fraction ought to be equal to 2. But no fraction in its lowest terms can be equal to 2; for if it was equal to 2, it would not be a fraction in its lowest terms. Therefore, the fraction first proposed cannot have been with exactness the square root of 2.

There is also a geometrical proof that the diagonal and side of a square are incommensurable; which may be found at p. 270 of Professor James Thomson's Euclid.

This will throw light on what is meant by quantities being *incommensurable.* And now to return to the question of the circle, and what the supposed defect or difficulty is. The idea uppermost always is, that if a man has a circle of a given diameter, he cannot tell exactly what the circumference will be. What, then, will content him? If his circle is of a mile diameter, will he be content to know the circumference within a hundredth of an inch? Will he be content to know it within a millionth or a million-millionth part of a hundredth of an inch? Will he be content to know it within the same magnitude, though the diameter of his circle should be increased to a million or a million millions of miles? Will he be satisfied if the diameter may be increased, and the possible error at the same time reduced, by millions of million times over and over till it becomes weariness to keep count? Somebody may think this an exaggerated statement. Go we therefore to the evidence.

The process of finding the length of the circumference to a given diameter, is conducted by describing polygons of the same number of sides, exterior and interior to the circle, and taking advantage of the fact that the length of the circumference must be intermediate between the sums of the sides of the two. It may be found in "Professor Young's Elements of Geometry," p. 130, "Leslie's Rudiments of Plane Geometry," p. 113, and various other places. In the last century, a Dutchman is recorded to have carried the calculation to eighty figures of decimals, and had them inscribed upon his tomb. Improvements have been made in the process, and Professor Young, in his work above mentioned, p. 133, gives as far as a hundred figures of decimals as follows; and adds that the number has been extended by later mathematicians thirty or forty figures further.

3·1415926535,8979323846,2643383279,
5028841971,6939937510,5820974944,
5923078164,0628620899,8628034825,
3421170679

Let it be seen, then, what these errors are, which mankind is supposed to be complaining of. If in the proportion above given we stop at any figure of decimals, as for instance the fifth, the difference arising from increasing the last figure by 1 would be $\frac{1}{314159}$th of the whole. We may therefore divide this denominator by ·26 (which is nearly equivalent to multiplying it by 4), inasmuch as the remainder decimals after the fifth, point only to the possibility of that portion of surplus. And in the same way in other cases.

If, then, a man had a circle of radius equal to the distance of the sun (estimated at 95,000,000 miles), how many figures of the proportion must he take to find the circumference to the hundredth of an inch? The number of hundredths of an inch in 597,000,000 miles (the roughly computed circumference) is in round terms 3782 billions, or a hundredth of an inch is the 3782 billionth part. But if fifteen places of decimals are taken as above, the possible error will be considerably less than the 3782 billionth part, and consequently than the hundredth of an inch.

The distance of the fixed stars is estimated at 200,000 times the distance of the sun. If, therefore, our inquirer should be anxious to have his circumference correct to the hundredth of an inch at the distance of the fixed stars, he has only to take twenty figures of the proportion, and the thing will be done. Or if he preferred it, he might have his circumference at the distance of the sun correct to the 200,000th part of the hundredth of an inch, if that would be satisfactory for the purposes required.

If he chose to use eighty places of figures, he might have his circumference correct to the hundredth of an inch, at a distance equal to as many times the distance of the fixed stars as would be expressed by 1 with 60 ciphers after it, if anybody can revive his acquaintance with the Numeration Table sufficiently to give it name. And if he chose to take 140 figures, he might do it at a distance multiplied again by the same enormous multiplier.

What is clear is, that the pains taken to carry the calculation to this excessive number of figures, can have proceeded from nothing but the absence of suspicion that the things were incommensurable, and the expectation of coming to something like a "finality." Perhaps in other cases than mathematical, the expectation of a "finality" may be equally groundless.

With the extended proportion in our hands, it is easy to calculate the errors of the abbreviations at different times in use.

In Solomon's time the proportion appears to have been known no nearer than

that of 1:3 (2 Chron. iv. 2); and there are classes of artisans at the present day who find this sufficient for their use. Of which the error is in round terms $\frac{1}{21}$st part of the faulty circumference too little, or $\frac{1}{22}$nd of what it ought to be.

The proportion of 7 to 22 is that of 1:3·142857&c., which is greater than the true by ·001264&c.; and dividing the true by this last, gives 2485, or in round terms the error is the $\frac{1}{2500}$th part, showing that the proportion of 7 to 22 is competent to a very large number of worldly purposes.

The proportion of 113 to 355 (invented by Metius in the early part of the 17th century,) is that of 1:3·14159292035 3&c., which is greater than the true by ·000000266764 &c. And dividing the true by this last, gives 11776666; or, in round terms, the error is the twelve-millionth part. Showing that there are few imaginable purposes for which this proportion is not sufficient.

A useful piece of artificial memory attaches to this proportion of 113 to 355. In my undergraduate days, the most eminent man in Cambridge was explaining something about the circle, and trying to call to mind the proportion between the diameter and circumference. He was seen dashing down various collections of numbers, and vigorously making a division among them with his pen. At last he broke out, "*There! Write down the three first odd numbers by pairs, and cut them in half; 1 1 3 | 3 5 5; You'll never forget that!*" And I never did. The driver of a cabriolet in Paris was much delighted at being told this; the conversation, it is believed, having turned on the number of times his wheel went round in a mile.

The phrase "Quadrature of the Circle" arose from the question being first put in the shape of demanding to know the side of the square which was equal in area to the circle. The area of the circle is manifestly equal to the rectangle of which one side is equal to the circumference and the other to half the radius. And the square which is equal to this (Euclid ii. 4) will be equal to the circle. In which the accuracy of the rectangle is, of course, of the same description as that of the circumference.

There are curious examples of the power of numbers in some of these, which, if true, no British mechanic will be the worse for having before him. If they are not true, somebody will be found to set us right.

I am, Gentlemen, yours sincerely,

T. PERRONET THOMPSON.

Eliot Vale, Blackheath,
Nov. 7, 1857.

THE SOCIETY OF ARTS EXAMINATIONS.

A noteworthy circumstance has brought the Society of Arts Examinations to an end. Dr. Booth, who has taken a very active part in them, and was at the head of the Board of Examiners, fancied it would be a pleasant thing to get a special fund set apart for the purpose of meeting the expenses incurred in connection with them. Such a fund, beside the intrinsic charm which all money has, would bring a very desirable amount of patronage to the gentleman who was fortunate enough to get the administration of it; for paid examiners would have to be selected, and so forth. The sum annually derived from the Mechanics' and other institutions amounts at present to some hundreds of pounds per annum, and might be increased considerably hereafter. Here, then, was a temptation! Last week, therefore, Dr. Booth called a special meeting of the Council of the Society (of which Council he was chairman), and at this meeting the transfer of the aforesaid fund to a committee, composed partly of members of Council and partly of members of the Board of Examiners, was duly proposed. Unhappily, however, for the promoters of this little scheme, a member of the Council opposed the motion, *in limine*, on the ground that the Council had no power under the Charter of the Society to oblige any gentleman or gentlemen by handing over the administration of the society's funds, or of a portion thereof, into his or their hands. The Council very wisely and very firmly supported the speaker, and refused to discuss the proposition. Such a touching disappointment could not, of course, be borne meekly. The Rev. Dr. Booth consequently called a meeting of the Board of Examiners, or rather of such of them as he knew or believed to be friendly to his various schemes, and at this meeting told certain tales about the secretary granting a summer or autumnal holiday to his assistant, and in other magnanimous ways resented the conduct of the Council, the chair of which he resigned. Most of the morning papers published long accounts of what Dr. Booth said and did at this meeting. The *Times*, however, waited a day, to hear both sides, and then briefly informed the public of the facts of the case, not forgetting to let them know that it was the Council itself which demanded the resignation of Dr. Booth. We have thus briefly sketched the more prominent features of this affair, in order to correct some erroneous statements which have got abroad, and to place the subject in its true aspect before our readers. It suits the purpose of Dr. Booth and his friends—we ought per-

haps to say his votaries—to make the public believe that the Council of the Society has suppressed the examinations, and Mr. Baines, Lord Brougham, and others, have rashly accepted the statement. But the Council has never even contemplated such a step. On the contrary, all its arrangements have throughout been made, and its measures taken to place them on a sound and durable basis. In conclusion, we recommend our readers to wait for the Society's official statement of the case, which will, we doubt not, amply justify the Council's arrangements, and make the egregious errors of Dr. Booth's conduct known. If this is done, the sympathy shown for that gentleman will, we believe, be very greatly diminished. His haughty spirit even professes to be injured, because the Council refuses to open the columns of the Society's *Journal* to him, without retaining the ordinary Editorial prerogative of excluding what is known to be false or unfair. This he is now pleased to call a *censorship.*

THE PROPOSED MONSTER SHIP "PALMERSTON'S FORESIGHT."

After the publication of our remarks upon Mr. John Clare, jun., and his vagaries, in the *Mechanics' Magazine* for July 11th, we heard nothing of this eccentric gentleman for many weeks, except that a subscription had been set on foot for his benefit. Even the *Mining Journal* was, for a time, if we remember rightly, mute respecting his denunciations and promises. Recently, however, on observing in a newspaper paragraph that a model of a monster ship, dwarfing even the *Leviathan*, was on exhibition at Liverpool, we suspected that the name of Mr. John Clare, jun. would soon shine forth again. We were not disappointed, for speedily it was announced that Mr. John Clare and his model were in town, at the Treasury Office, at Lloyd's, and so forth. Having been favoured by an invitation to see this model, we availed ourselves of the same, and on Friday last took the trouble to inspect this new wonder. The model is about 5 or 6 feet long with a breadth of about one-tenth or one-twelfth of its length, and a draught of water of about two-fifths of the breadth. (These proportions were roughly obtained, but are doubtless near the truth). Consequently, a ship constructed after the fashion of Mr. John Clare's model, if 600 feet long, would be about 50 feet or 60 feet broad, and about 20 feet or 24 feet draught of water. Her sides are vertical, or very nearly so; her floor is all but flat, without an external keel, and her sides and floor break into each other with a very sudden curve, that is, the bilge is just rounded slightly off into the side. The water lines are rather hollow, but not very fine. Now, we should like to know what there is in a vessel so constructed to go to Lloyd's and the Treasury about, or to warrant the designer in painting the name "Palmerston's Foresight" upon her quarters! It is an insult to any man of business, whatever his position be, even to direct his attention to such a thing. It is possible that Mr. John Clare will say that his improvements are to be found in matters of detail, not to be seen in the model. But why in that case invite us to inspect the model? We feel bound to say that it is perfectly preposterous for persons, whether journalists or others, to pretend, as some pretend, that it is any part of the duty of the Government to listen to the proposals of a man who bases his claim to attention upon mere bluster about improvements which cannot even be found when sought for. We hereby offer Mr. John Clare a column of our Magazine for the purpose of stating succinctly therein the nature of his improvements. If he should, in availing himself of this offer, advance any really promising suggestion or suggestions in a plain straightforward manner, he will do more to justify his own pretensions than any newspaper whatever can do for him by pompous but meaningless paragraphs. If he should not succeed in doing this, our readers at least will know in what class of agitators still to rank him.

ON LIGHTING MINES BY GAS.

The first meeting of the session 1857-58 of the Institution of Civil Engineers, on Nov. 10, Robert Stephenson, Esq., M.P., President, in the chair, was occupied by receiving a paper On Lighting Mines by Gas, by Mr. Alexander Wright, Assoc. Inst. C. E. The author remarked that the present mode of employing tallow candles or oil lamps, was prejudicial to the health of the miners, whilst the light afforded was inadequate. The expenditure of oil and tallow in the mines of England might be roughly estimated at £500,000 per annum. In Cornwall and Devon alone there were about 30,000 men employed underground, who were lighted at an annual expense of £90,000 per annum; and in one of the large mines the annual expenditure for candles had reached as high as £7,000. An attempt had formerly been made at thee Tresevean mine, in Gwennap, to introduce gas, but it was abandoned. The author thought it was preferable to make the trial upon a mine where explosive gases were not given off, as in coal mines, and where the work was closer and did not extend so rapidly.

The first object was to light the ladders, and afterwards to extend the system to the working chambers following the lode. The mine selected for experiment was the Balleswidden mine. The gas introduced to this mine was manufactured at the surface, and was forced by a pump into a heavy gas-holder, composed of cast-iron plates, whence it issued by a descending pipe into the mine, under a pressure equal to 18·7 inches of water. The shaft and levels were fitted with wrought-iron tubes, proved by high pressure steam, and from the branches flexible tubes and burners were carried into the pitches and chambers for the miners, and to the floors for picking the ore. The tramways also had a sufficient number of burners, to preclude the necessity for using any candles or lamps in the mine.

The comparative expense of the two systems of lighting was stated to be much in favour of gas, as the annual cost of candles was £834 3*s.* 4*d.*, whereas that of gas was £487 2*s.*, including interest on plant, wear and tear, and all expenses. If several mines combined, the economy would be still greater; and when the system became more general, modifications would doubtless be advantageously introduced. It was stated that the sanitary condition of the mine was visibly improved; the ventilation was better, and there was an entire absence of the sickening smoke and bad odour previously pervading the mine, which the author believed to arise from some particular compounds of hydrogen and carbon given off during the imperfect combustion of the candles. The experiment was stated to have been completely successful, and there did not appear to be any reason why the system should not be extended to mines generally, and, under certain precautionary measures, to coal mines.

THE LAUNCH OF THE "LEVIATHAN."

Recent inquiry has put us in possession of the following information respecting the launch of the *Leviathan*, which may be relied upon as authentic. It will be found to differ, to some extent, from other published accounts.

It appears that on the Sunday previous to the attempted launch the cables were hove up as taut as possible and remained so until 12 o'clock on the day of the launch. A vertical white line was painted on each drum, to enable Mr. Brunel to see at what rate it was revolving. Both drums were then hove back to give 4 links slack. This gave about 11 inches for the ship to move before the cables became taut. The first mistake consisted in having the pinions fixed in gear with the drum, instead of having them to ungear like an ordinary crane. The next error was in the men at the after drum stopping at the handles, instead of withdrawing as they did at the foremost drum. The result of this was, that when the ship started, and the chain became suddenly strained, the men were knocked right and left, and it was only by great good fortune that they were not all killed upon the spot. Upon seeing what was the matter, Mr. Brunel instantly gave orders to apply the break. When the attempt to launch the ship was repeated the hydraulic rams could not be got to bear, as the short pieces of timber were crushed as soon as the pressure came on them. The next thing that gave way was the spur wheel of the foremost engine; and lastly, the ⅞ chain fall, that was attached to the foremost heaving-off-chain, broke. But none of the cables were at all injured. November 17, 1857.

During the last few days the workmen have been very busy with the *Leviathan*. The wheels and pinions have been removed from the check drums; the hydraulic presses used at the former trial have been refixed, and four additional presses fitted, two to each cradle, and all arranged to work together as one. The steam winch that broke has been replaced with a stronger one; the hand winches have been removed from the barges, and are fixed on shore, so that the whole of the power, both for heaving off and checking, is now on the land side of the ship. It is expected that everything will be complete by this afternoon, and if so another attempt will be made to launch to-morrow (Wednesday), as the "ways" are sinking with the weight of the ship. November 19, 1857.

The launch could not be attempted yesterday, as one essential part of the apparatus had not arrived.

Nov. 19, 4 P.M.

An attempt to launch the ship was made at 1 o'clock this day, but failed through the breaking of a chain—we know not which.

THE ANCHORS AND CABLES OF THE "LEVIATHAN."

The two Trotman anchors manufactured by Wood, Brothers, and tested at Woolwich, have both broken under the test. The one, tried on Nov. 2 broke at a pressure of 98 tons, instead of standing 110 without injury; and the other, tried on Nov. 5, cracked at 92 tons, and was pulled quite off the next day at 101 tons, the shanks having a considerable permanent set, and the fractures showing very bad workmanship, the first being scarcely welded at all, and the other being bad through quite one third of the scarph. When it suited the patentees' or manufacturers' purpose, they were, if we mistake not, called 7-ton anchors, the stock being weighed in with them; now they have broken, they are said to be only 5 tons.

This is about what they should be called, as it is not the custom to reckon the stock; so that, in fact, the anchors are nothing out of the common. The chains, however, are the largest ever made, being 5·8 inches larger than those of a line-of-battle ship. The whole of these have been manufactured by the firm of Brown, Lenox, and Co., of the Millwall Cable Works, who have also constructed a testing-machine to prove them of twice the power of any other testing-machine in the country, being capable of exerting a pressure up to 300 tons.

The Useful Metals and their Alloys, including Mining Ventilation, Mining Jurisprudence, and Metallurgic Chemistry employed in the Conversion of Iron, Copper, Tin, Zinc, Antimony, and Lead Ores, with their Applications to the Industrial Arts. (In one Vol.) By J. Scoffern, A.B; W. Truran, C.E.; W. Clay, R. Oxland, W. Fairbairn, F.R.S; W. C. Aitkin, and W. V. Pickett. London: Houlston and Wright, 65, Paternoster-row. 1857.

It will be as well to inform our readers that this is the complete form of the work, the publication of which was commenced under the title of "Orr's Circle of the Industrial Arts." The names of the authors given above are so well and so favourably known, that it is unnecessary for us to mention the merits of the book before us. We will only say that the several treatises are worthy of their authors; and we recommend every one who desires to possess himself of 650 pages of invaluable information respecting the metals, their production, their treatment, and their applications, to purchase this very cheap volume. We do not, of course, profess to sanction every portion of it; indeed there are in it statements which we know to be mistaken; but these are not such as to materially diminish its value.

On the Application of Cast and Wrought Iron to Building Purposes. By William Fairbairn, C.E., F.R.S., &c., &c. Second Edition, greatly enlarged, with Corrections and Additions. To which is added *A Short Treatise on Wrought-Iron Bridges.* London: John Weale, 59, High Holborn and St. Mary's, Cambridge, 1857-58.

The appearance of this useful work in an enlarged form is very gratifying, as in the present state of practical science there is no guidance equal to that which Mr. Fairbairn here gives, which can be resorted to when any novel application of iron to building purposes arises. The following outline will afford a clue to the contents of the new volume. In the section on cast-iron beams but little new matter is added; for Mr. Fairbairn tells us, in the course of his experience he has seen no reason to change the opinions he had previously expressed on the uncertain and dangerous character of trussed girders; and he still advises great caution in their employment. A very interesting and important section on wrought-iron bridges has, however, been added; and beside this we have the designs of a bridge prepared by Mr. Fairbairn for crossing the Rhine at Cologne, but not erected; and also an account of the "delays, intrigues, and other disengenuous contrivances which led to its suppression."

The style of Mr. Fairbairn's works is so familiar to our readers that we need not enter into a description of the manner in which he discusses the subjects newly introduced here. No intelligent builder or architect, who aims at any considerable skill in his profession, can afford to dispense with a careful perusal of this invaluable work.

THE WAVE LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

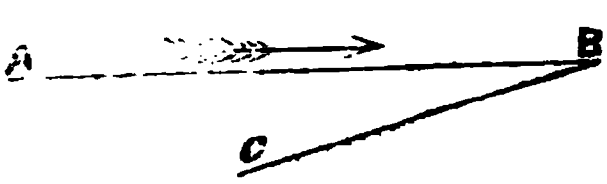
Gentlemen,—Without wishing to disparage Mr. Moy's labours, or, in the slightest degree to impeach his general intelligence (which is obvious) as I think good may arise from a few remarks upon his last paper, I venture to submit them. To my knowledge, *dilettanti* have found dabbling in naval architecture a pastime that is peculiarly ruinous.

The "wave-line" bow has produced mischief in sailing vessels. The immersed fore body is not so deep in the water as it would be if detached from the midship body: it is held up, as it were, by its connection with the more buoyant part of the ship, and has a constant tendency to droop and break the shear of the vessel. This tendency is considerably augmented by the weight of the bowsprit, anchors, and other gear about the forecastle. So inordinate was the stress of this kind in one ship which I inspected a few months back, that the butts of her deck had opened, her stringers had moved at their joints, and a number of diagonal iron ties or riders were introduced to stop the disruption of the vessel's fore body, which those symptoms threatened. With the "wave line," the amount of stowage obtained by a given expenditure of materials is very much diminished. Nor is it found that an increase of speed results from this form to compensate for those serious evils; on the contrary, at Liverpool, the concavities of the wave lines of "clippers," have been filled up, and they have been thereby rendered faster sailers and better "sea boats."

And with regard to steamers, experience has not established the theory of the wave-line, as laid down by one of our most celebrated scientific shipbuilders. Indeed, although it may be shown that curve lines of a prolate cycloidal character are necessary between the "fore foot" and the water line, it may also be shown that at the water line a parabolic curve is preferable: this, however, opens too wide a subject to be entered upon at present. It may be useful to remark that a large steam yacht recently built in the river Thames on the wave line principle, is not remarkable for her speed; and I am sure the eminent engineers who fitted her admirable machinery would not recommend the adoption of her bow lines in any other yacht.

Having premised thus much of a practical character, I proceed respectfully to offer an objection or two to Mr. Moy's theory. The clearness of his diction appears to render his mistakes more manifest. He says, "the effect of the onward motion of a well built vessel, on the wave line system, upon the water, is to drive the water in *directions perpendicular to the line of motion.*" This appears to me to be Mr. Moy's fundamental mistake. The bow may be a plane and drive the water before it in the line of motion, or it may be two acute angles; but however acute those angles may be, their incidence with the fluid will drive it in a direction less than a right angle with the line of motion, till the floating body becomes a mathematical line.

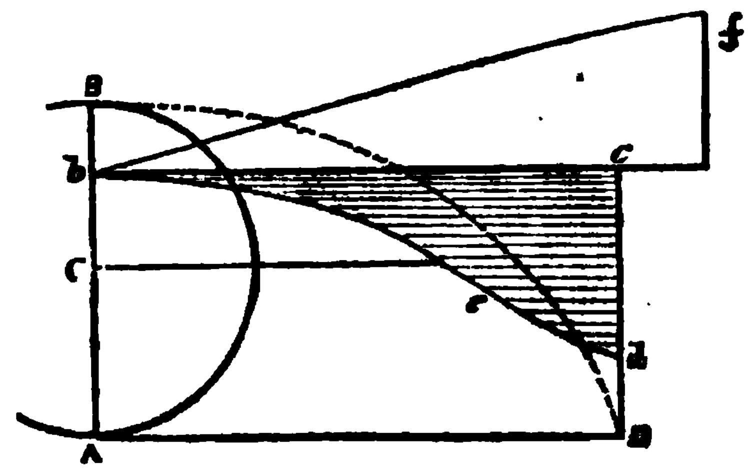
If A B be the line of motion, B the stem,



and A B C the angle of the bow, we may conceive of the angle being reduced indefinitely, and the water impinged against being driven in a direction *approximating* to a right angle with the line of motion; but it cannot be driven in that direction absolutely till the lines C B and A B are identical: *but then the body ceases to have* BREADTH, *and the whole case vanishes.*

What is generally considered the wave line is the prolate cycloid, *b, d*, in the following diagram. If the circle A B be rolled on the line A D the point B will generate the cycloid B D, and the point, *b*, will generate the wave line, *b, d*. The plane, *b c d*, is a horizontal section of a wave line bow.

Now, there is no portion of this curve, if the line of motion be *b c*, that will not present an angle of incidence to the water against which it impinges; and the force will be communicated to the fluid if such portion be conceived to be an infinitely



small plane, in a direction at right angles with its surface.

But, it will be observed, that, although the wave line leaves the stem at a very acute angle, at *e*, it makes a very obtuse angle with the line of motion, having a tendency to drive the water in a direction at an angle of about 45° with the fore and aft line; and, as might be supposed, the hollow line before this is calculated to produce an abnormal increase of water about this spot. I placed myself on the paddle-box of a Gravesend steamer, when the yacht above referred to was tried, and distinctly observed a considerable accumulation and elevation of water at this part of her bow, the retarding effect of which cannot be doubted.

It will occur to Mr. Moy that if a convex line be used for the bow, it may be carried *further aft than the wave line with the same amount of displacement;* thus, the line *b f* may give more displacement than *b d*, and perhaps more speed. This is also an important consideration. These hints are offered to Mr. Moy with every wish to bring his mind to a correct conclusion, without wounding his feelings. His calculations as to power and speed I cannot refer to without a risk of doing the latter.

I am, Gentlemen, yours, &c.,

NAUTICUS.

RAILWAY GUARD AND PASSENGER SIGNALS.

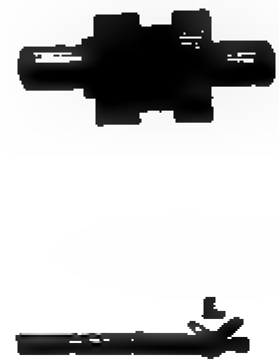
To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The correspondence which appeared in your last month's Part with reference to railway signals between guards and passengers and engine-drivers, induces me to send you a sketch of a plan for effecting the same which suggested itself to me some time since, and which I think will be found simpler than any of those as yet proposed.

In the accompanying sketch, fig. 1, A is

a portion of the dome of a locomotive boiler; C is a small cylinder attached to the side of it, open at top into a steam whistle, B; E and F are two steam openings into the cylinder; D is a piston working steam-tight in same, with weights, G, attached to the end

Fig. 1. Fig. 2. Fig. 3.



of the piston-rod, sufficient to draw down the piston to the bottom of the cylinder when not supported by the pressure of the steam under it; the pipe, F, is continued from the cylinder through the joint, H, flexible tube, K, and through as many similar connexions as there are carriages in the train, to the cock, L, in the guard's box, which can be opened or closed by a handle.

The action of the whole is so obvious as scarcely to require explanation. When the cock, L, is closed, the pressure of the steam being maintained throughout the tube, keeps the piston, D, at the top of the cylinder; when it is open, the pressure is withdrawn, and the weights pull the piston down, and thereby open access for the steam to the whistle, giving the signal required. It is obvious that cocks similar to that in the guard's van could be placed at intermediate points in the tube within reach of the passengers.

The joints of the tubes should be of conical shape, grooved into each other, and kept tightly together by two rings connected by elastic bands, as in figs. 2 and 3; the flexible tubes to consist of jointed metal tubing inside; strong India-rubber tubing over this, bound round with iron wire; the joints of the inner tube to have bevelled ends fitting slightly into each other, so as to allow a little play.

I am, Gentlemen, yours, &c.,

THOS. C. HAINES.

Cork, Nov. 9, 1857.

AN IMPROVED SUN GAUGE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—There is a description of an instrument thus called in the last number of the *Philosophical Magazine*, which I do not think is on a principle the best for the purpose, it being that of evaporation, produced by the agency of the sun's rays. It does not appear to me sufficiently delicate, because a considerable degree of heat is necessary for the process, as the glass bulb wherein is the water must be penetrated, so that much heat must necessarily produce no effect.

What I would propose is, that a bar of metal, as that of a pyrometer, should be fixed on a stand, having the end, where expansion takes place, to communicate, by means of a lever or levers, with a delicate break, which should press more or less upon an even wheel, according to the expansion of the bar, which wheel should press against other even ones for the regulation of the motion, as in a common clock, and the whole be moved by a weight or spring. There should of course be an index and dial for registering its motion.

Now, when the iron is cold, the break should prevent the wheels from moving at all, and by giving way allow them to move more or less freely as the iron expands, when the space passed over by the index will indicate the quantity of heat to which the instrument has been subject.

This would not be a self-registering thermometer exactly, as the highest temperature during a given period could not be ascertained, but such an instrument could be made by fastening a pencil to a lever connected with the bar, the lever to slide in a groove, and a roller to move against the pencil, so that the highest and every degree of temperature to the lowest could be seen.

I am, Gentlemen, yours, &c.,

J. A. D.

Nov. 16, 1857.

THE IRON QUESTION.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Allow me to inform your correspondent, "J. V.," that his kind suggestions in reference to the employment of deoxidizing gases and the oxide of carbon in connection with the new process of manufacturing iron and steel is not new, it having been long since conceived and patented by Mr. Bessemer himself.* I do not know if the idea has ever been put into practice, or even tested. Perhaps it has not; for, however long may be a man's purse, or however indefatigable he may be in the prosecution of his researches and experiments, the full development of his conceptions must necessarily be a work of time. In all cases where furnaces, and such like, are required, as in the Bessemer process, this is especially the case. A person, however, of a fertile genius having hit upon a grand idea, at once dives boldly into the future in order to discover not only the means and materials for perfecting his ideas, but also of preventing others from forestalling him in the details of his invention. For as there are few laws through which a carriage-and-four may not be driven, so there are few patents in which loop-holes of a greater or less extent may not be discovered. The genius of the inventor, therefore, consists not only in conceiving new ideas, but in perceiving the several means by which they may be carried out; and having done this, of fixing upon the best. Nor is the true inventor—that is, the heaven-inspired conqueror of obdurate matter—easily daunted by difficulties or even failures. Step by step he goes on conquering and to conquer, as did Palissy, the potter, as did Cort, and the long list of scientific and mechanical benefactors of mankind, whose monuments cover the face of the earth in their never-dying works; and as is Bessemer at the present hour. The number and variety of the modifications which Mr. Bessemer has patented in connection with his iron and steel discovery, shows the fertility of his genius and the depth of his discernment; and though he should never require to employ them all, they will tend to hedge in and protect him from the inroads of the many imitators who, since the first publication of his discovery, have striven to retard him in his course.

I am, Gentlemen, yours, truly,
WILLIAM GREEN.

Pembroke Cottages, Caledonian-road,
Nov. 16, 1857.

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* See *Mech. Mag.*, vol. lxvi., p. 221, and vol. lxv., p. 473.

ROBERTS'S PATENT PUMPS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I beg to inform "Enquirer" that the length of the lead suctions used at the trials of pumps on board the *Fisgard*, was from 23 to 24 feet (I cannot say exactly without going down to measure) and the perpendicular lift 15 to 16 feet; the leather suction was 31 feet, and the delivery hose 41 feet long and 2½ ins. diameter. The suction of my pump is 3 feet, the diameter of cylinders 5½, and stroke 6 feet. Downton's delivery hose was the same size as mine, but about 10 or 12 feet shorter, including a piece of suction pipe to go over the coaming, so that there should not be any sudden bend in it. If "Enquirer" wishes any further information, I shall be happy to give it either privately, or through the *Mechanics' Magazine*; but I think, with you, if "Enquirer" will carefully read your article in No. 1787, he will not find any difficulty in forming a pretty correct estimate of its value, at least as far as Downton's is concerned.

I am, Gentlemen, yours, &c.,
W. ROBERTS.

Nov. 16, 1857.

DRAKE'S IMPROVEMENTS IN CANNON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In your number, 1787, very appropriate remarks are made by a professional gentleman relative to "Monster Guns," and on the inadequacy of cast-iron cannon above 6 ins. calibre to sustain a large charge of powder and heavy shot. It was this fact which induced Dr. Drake to suggest his safety hydraulic and compressed air principle to the committee of 1854, and my elongated charge chamber, much the same as in the old plan mortar, when we brought under notice the breech-loading 12-inch guns invented for coast and harbour defence, weighing, when mounted, from 15 to 25 tons.

Size and weight have their limits, and I am not one of those who think, because a thing can be made, that it should be made; for I am ever ready to yield to utility in such subjects, and never considered it necessary to exceed 13 inches in the diameter of spherical projectiles—being, in my opinion, sufficiently large and ponderous for real destructive purposes.

My 12-inch guns I feel convinced will destroy all the present class ships of war, even if the sides are three times as thick as at present constructed; and it was for this object I invented them, the weight for land batteries not amounting to an objection.

Although young at the date when Admiral Sir John T. Duckworth was driven out of the Dardanelles by monster guns, I remember the effect the stone shot had on the *Royal George*; and, to the best of my recollection, the brass gun brought to England by the admiral had a 16-inch calibre.

Since then, and even since I commenced my improvements in cannon, I became acquainted with the distinguished scientific officer of the Napoleon school who mounted many of the cannon for the Turkish Government; and among my papers will be found, in his own hand-writing, made at my request, the weight of shot and range of Dardanelles guns; but I could see no necessity, as before remarked, for exceeding 13 inches in the diameter of spherical iron projectiles.

After the bombarding of Algiers, I inspected Lord Exmouth's ships, particularly the *Impregnable* (sadly cut up) and witnessed quite sufficient to tell me what class of gun was required to produce the greatest mischief; and, after the siege of Antwerp by the French, I went over the works and citadel, and was soon convinced the French monster mortar was not so destructive in its effects as anticipated.

In an open space exposed to its shells, a bombproof hospital was constructed *pro tem.* It was roofed with two layers of baulk timber crossing at right angles, well shored up with the same material, and covered with earthwork about 13 feet deep, on which the shell descended comparatively harmless; and it appeared to me very evident, however ponderous projectiles may be, works of this description may be constructed to destroy their effect just as much as firing into the earthbanks at Woolwich; and that, for the destruction of towns and the ordinary class buildings, and for the destruction of troops also, the 13-inch shell of our service was perfectly adequate; but if the range of our mortars could be increased, it would be extremely desirable. With this impression I constructed long range 13-inch mortars of 10 feet, instead of 5 feet 3 inches—thus increasing the distance about 2,000 yards beyond the common sea-service mortar of 4,200 yards' range with 20 lbs. of powder, which I propose to increase in the new mortar. It is so constructed and mounted as to fire at the angle 45° over a parapet, or horizontally through an embrasure; and may be used as a broadside gun amidships in line-of-battle ships on the lower deck. As the substance at the breech is increased 1 inch, it will make the mortar, including the chase, about 8 tons instead of 4½ tons.

I have also 10-inch guns thicker at the breech than usual, with a slighter chase, mounted for ship purposes, for attacking land batteries, and for bombarding; to be fired through the side on the lower deck, like the usual gun, at an elevation of 30° or more, and to depress so as to plant the shot between wind and water at short distances.

The 8-inch and 10-inch guns of the usual pattern have burst at Shoeburyness, when fired at high elevation with solid shot. A new pattern 10-inch gun burst after a discharge of 54 rounds fired at the angle 32°, with the usual quantity of powder, 16 lbs.; weight of gun, 116 cwt.; length, 10 feet; hollow eccentric shot, 100 lbs.; extreme range, 5,860 yards. I believe my guns will range above 6,000 yards with safety at the same angle, being constructed thicker at the breech, and so mounted as to reduce the impact by recoil or otherwise. But I find I have intruded upon your space, and will omit for the present my remarks relative to the construction of compound guns noticed in your last number.

By the description which I shall give from the number of inventions to which I have already called your attention, I feel convinced the gentlemen interested in this part of the subject will find themselves more or less anticipated; and I still have to regret that the committees of 1854 and 1856 had not the opportunity I sought of going more into the merits of my inventions than they did.

I am, Gentlemen, yours, &c.,

JOHN POAD DRAKE.

London, Nov. 9, 1857.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—As a practical gun-maker myself, and also as the son and grandson of practical gun-makers, attached to the Royal service, and having assisted, by official instructions, in gun practice at Woolwich, I naturally take an interest in everything relating to improvements in cannon or small arms; and I hope you will not think me intrusive in stating that I have with satisfaction seen the engravings and read the letters which have appeared from time to time in your valuable Magazine. Hoping I shall not take too much space, I will offer an opinion, without, I hope, offence to any one; and I must candidly state, that I consider the American guns ill calculated for the purposes for which they are intended, and were purchased by the minister at war. I am also of opinion that arms of the service should be as free from complication as possible, which is not the case with the American guns, which have several movements for loading and firing. Now, Mr. Drake's have not these, and whereas the screw in the American is liable to get set or out of working order, owing to the ex-

pansion of metal which is certain to take place, more particularly in cast iron, and to the screw being placed before the charge; which will cause it to set in the gun.

Contrasting Mr. Drake's anterior invention with the American, I consider Mr. Drake's far preferable, and that the duplex breech can be fired even too quickly for any metal to bear, unless there is a great supply of water; and that the single breech will fire three to one quicker than any gun loading at the muzzle, and can be served with five men, whereas it takes ten to work the ordinary 32-pounder.

With these plain remarks I conclude, hoping that Mr. Drake's guns may have a fair and impartial trial.

I am, Gentlemen, yours, &c.,

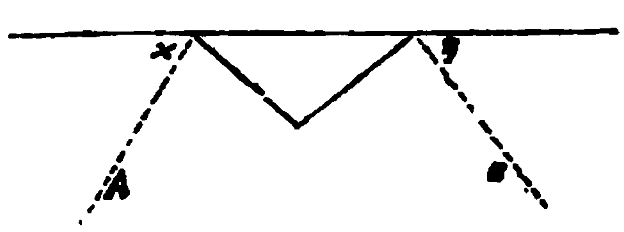
CHARLES HOLLAND.

15, Seymour-street, London, Nov. 9, 1857.

PRISMATIC DECK LIGHTS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I have wondered why deck lights are made of this shape, as I cannot see any advantage in it, except perhaps a little additional strength, while it has the great disadvantage of being about the worst possible shape for diffusing light. May be the manufacturers are not aware of, or more probably do not trouble themselves about this; but every scientific man must know that what I say is true. When light falls upon the surface of a prism it passes down



till it encounters either oblique side, when instead of being sent downwards, it passes up again at right angles to the plane. I now speak of light descending vertically, that which passes through the oblique sides being only that which falls at right angles to them.

Thus rays in the directions A and B are only those which can pass through the prism, from which it is clear that x and y can receive no direct light. This can be all proved by looking at a prism in the position of a deck light, as seen from above, when the reflection of the light will be evident, and also by surveying it as seen from a ship's cabin. I need hardly say that what I would have is a common thick piece of glass with parallel surfaces.

I am, Gentlemen, yours, &c.,

J. A. D.

Nov. 16, 1857.

MR. HOLLAND'S DECIMAL SYSTEM.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In my letter to you, inserted 7th Nov., I proposed to depart from what I had declared to be the proper conditions under which the weights should be derived from the measures, and thus to create a defect in the perfect decimal system described in your journal, 22nd August. The French, in the formation of their metrical system, introduced the same defect for no purpose whatever, except it was to make a very bad system still worse. My reason for doing so was to place us more in unison with France and the German Zollverein. I propose now to add another defect which will detract from it as a piece of scientific construction, but make it materially better for the use of commercial men. I propose to make the gallon of water into 8 lbs., and not into 10 lbs., or, in other words, the 10 lbs. shall be equal to 1¼ cubic peds, or new feet of water. Then the new lb. and centner will be exactly the zoll-pound and zoll-centner of the German customs-union, and half the French kilogramme and myriagramme. The pound and centner would also come nearer to the present lb. and cwt. The centner would be 110·231 old pounds, and the millier conveniently near half a ton. The new bushel would weigh the same number of pounds as the present does present pounds. This would be very convenient to farmers and corn dealers, as they estimate the quality of grain by its weight. Corn, 62 lbs. to the bushel now, would continue to be 62 lbs. corn, or accurately 61·9957 lbs.

I am, Gentlemen, yours, &c.,

J. SIMON HOLLAND.

Woolwich, Nov. 12, 1857.

A MECHANICAL PHENOMENON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—May I beg to call your attention to a curious phenomenon I observed the other day in our rice mill. I was looking at some wheels in motion, turning mill-stones, while grinding rice, and I cast my eyes round the edge of an upright cog-wheel, and through its outer ring I could see two other wheels, one upright and the other a crown-wheel, both bevelled, working into one another; it seemed to revolve at the rate of about twice or three times per minute, and what was my astonishment upon going up to it, I found the revolutions to be at the usual rate of eighty per minute, and, moreover, the real motion of the wheels was in a contrary direction to what they appeared when first seen through

the cogs of the first upright wheel: I presume the apparent motion was the excess of speed that the pair of wheels was going over the upright wheel. Can any of your readers account for this curious apparent delusion?

I am, Gentlemen, yours, &c.,

THOMAS CROSFIELD.

Liverpool, Nov. 14, 1857.

STRENGTHENED CAST-IRON GUNS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Mr. Longridge, in his letter of last week, observes, "It is not my intention at present to enter into any narrative of the proceedings at Woolwich, which resulted from my endeavours to bring the principle I advocated to a fair and sufficient trial. I will only add that, up to the present time, no such trial has, to *my knowledge*, been made."

It appears his invention was brought under the notice of the Government June 19th, 1855, by himself.

Very possible his wiring a cast-iron tube gave the idea of casting brass or gun metal on a cast-iron tube for the same object, as there are guns now making at Woolwich as the invention of the *chairman* of the "Select Committee," which I have seen lately, of this description.

Will they be better than hooped guns or wire guns? is a question which Mr. Longridge may feel inclined to investigate; and, no doubt, Lord Panmure will be pleased to allow your correspondent every opportunity necessary to promote inquiry into the merits of the president's invention as compared with his original suggestion. Inquiry may lead to useful results.

I am, Gentlemen, yours, &c.,

OBSERVER.

MISCELLANEOUS INTELLIGENCE.

INSTITUTION OF ENGINEERS IN SCOTLAND.—The Institution of Engineers in Scotland will meet in the Philosophical Society's Hall, George-street, Glasgow, on Wednesday, the 25th November, at eight P.M. The following papers are being prepared for this meeting:—"On Blowing Fans," by Mr. J. Downie; "On a Blowing Fan," by Prof. W. J. Macquorn Rankine, LL.D.; "On a Screwing Machine," by Mr. S. M'Cormick: Mr. A. M'Onie will exhibit Mr. M'Cormick's machine. "On Measures of Length," by Mr. Walter Neilson; "On a Pumping Engine," by Mr. D. Mackain; "On Acadian Iron," by Mr. J. V. N. Bazalgette.

SIGNOR DE CHRISTOFORIS' APPARATUS FOR ASCENDING INCLINED PLANES OF RAILWAYS.—After the meeting at the Institution of Civil Engineers on Nov. 10, Signor de Christoforis exhibited and explained an apparatus proposed for aiding in the ascent of steep inclines. The system consisted in attaching to the periphery of the driving wheels of the engine a number of small wheels, which, abutting against a series of cogs connected with the rails would, it was assumed, constantly support the train in its ascent.

EXPLOSIVE SIGNALS.—Captain Norton, whose love of combining simplicity with utility is very marked, has shown us a simple method of arranging explosive "pull-signals." It consists in placing three or four lucifer tips in a chamber formed in the signal, and passing through the signal a small rod or wire of iron with a loop at one end and burred projections at the other. The parts are so arranged that when the loop is pulled upon, by a string or otherwise, the sharp burr on the rod is forced between the lucifer tips, firing them, and exploding the signal.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

JONES, E. F. *Improvements in the manufacturing of pig and bar iron.* Dated Mar. 2, 1857. (No. 604.)

This relates to heating the blast in smelting furnaces, and to heating air for warming and ventilating buildings, and consists in heating the air between two pipes, one placed inside the other, which are placed over a furnace, and so set as to admit of the flames playing first round the outside of the outer pipe or ring, and then passing by flues into the inner pipe or ring, whence they pass off to the chimney.

ROSE, T., jun. *Improvements in apparatus for cutting or disintegrating vegetable substances.* Dated Mar. 2, 1857. (No. 606.)

This consists of two hollow frustums of cones mounted on two horizontal axes, and placed side by side, the positions of the cones being reversed with respect to each other, that is to say, the large end of one frustum is placed to the small end of the other. These truncated cones are geared together by two spur wheels, and revolve in opposite directions. They have openings over their whole surface with blank spaces between them. The openings are for cutting teeth punched up in steel plates. The axes are mounted on a frame, and surmounted with a hopper.

MOWBRAY, F. W. *Improvements in weaving.* Dated Mar. 2, 1857. (No. 607.)

These relate, 1. To means for actuating rotary shuttle boxes in such manner that any one of the series of shuttle chambers therein may be brought into a line with the

shuttle race when required, a part or parts of which are applicable to operating upon sliding shuttle boxes. 2. To a peculiar arrangement of tappets used for tweel and satin stripes, so that a change from plain to tweel, or plain to satin, or otherwise, may be effected without stopping the loom, and which tappets are governed by jacquard or other pattern surface, parts of which arrangement are applicable to looms where no jacquard or pattern surface is used. 3. To apparatus for effecting the crossing of the pile threads over the pile wires when weaving piled fabrics, by the aid of longitudinal wires, in order to facilitate the change of pile thread, and more effectually divide the warp and pile threads. 4. To methods of weighting the bobbins carrying the pile warp used in weaving Brussels carpets and other pile fabrics. 5. To a method of operating the selvage threads to the adjoining selvages of fabrics woven side by side, and then separated by cutting up between the fabrics in order to obtain a good tie in of the weft at such parts. 6. To a method of governing the movements of healds or heddles. 7. To an adaptation of means for weaving gauze and other similar fabrics. 8. To a mode of operating selvage threads so that their action may be constant. 9. To means for effecting the letting off from the warp beam, and also the taking up on the work roller.

PAUVERT, C. *Certain improvements in manufacturing iron.* Dated Mar. 2, 1857. (No. 608.)

For full description see p. 249, No. 1779.

PAUVERT, C. *Certain improvements in manufacturing cast steel.* Dated Mar. 2, 1857. (No. 609.)

For full description see p. 249, No. 1779.

PAUVERT, C. *Certain improvements in manufacturing steel and cast steel.* Dated Mar. 2, 1857. (No. 610.)

For full description see p. 249, No. 1779.

POUPARD, W. *An improvement in buttons, and means of fastening buttons to garments and fabrics.* Dated Mar. 2, 1857. (No. 611.)

This consists in forming the backs of buttons in metal, with an aperture in the centre, and with a flap turned up at a point between the inner and outer edge of the back. In fastening them to garments, a metal pin is employed.

BROOMAN, R. A. *A method of constructing and heating buildings and apparatus for the winding of silk from the cocoon.* (A communication.) Dated Mar. 2, 1857. (No. 612.)

The object here is to permit of the winding or spinning of silk from the cocoon under every condition of the external atmosphere. It consists in fitting over the baths in which the cocoons are placed bells or receivers which communicate with the outside of the apartment and carry off the steam. Also in fitting the winding reels inside of glazed cases into which heated air is admitted through branch pipes, which rise from a main hot air pipe running under all the cases. By the reels being caused to rotate, a rapid circulation of heated air is caused in the cases, whereby the layers and threads of silk become dried.

PATRIDGE, D. *Improvements in steam boilers.* Dated Mar. 2, 1857. (No. 613.)

This relates to superheating steam. The patentee passes the steam through chambers (and not through a series of tubes) which may be adapted in size and form to any convenient part of the boiler, and may be heated by the flame coming from the furnace before passing to the fuel.

BROWN, W. *An improved mode of preparing tapes for the market.* Dated Mar. 2, 1857. (No. 614.)

The patentee winds the tape in the first instance upon a slip of wood of the same breadth as the tape, and when so wound up he secures the outer end by a band paper.

GRAY, T. *Improvements in separating vegetable fibres from mixed fabrics.* Dated Mar. 2, 1857. (No. 616.)

The patentee puts a quantity of waste mixed fabric (say 1 ton) into a revolving boiler, lets in water to wash it, draws off the water, and introduces (from 2 to 2½ cwt.) of soda ash, in its natural state, or caustic. He then admits steam, and boils for 6 or 8 hours. He lets out the woollen alkaline fluid, and then admits water into the boiler for washing the cotton, which is afterwards taken out and dried.

BANKS, J. *A new description of life preserver, adapted also to the preservation of property.* Dated Mar. 3, 1857. (No. 619.)

This consists in so constructing a life preserver, as to form a chest for containing clothes, &c. It is formed in several parts, and arranged so that when brought together, they form a hollow buoyant cylinder for receiving the body of a person.

LEUCHARS, W. *Improvements in locks for travelling bags, portfolios, despatch boxes, and such like depositories.* Dated Mar. 3, 1857. (No. 620.)

This relates to improvements upon a patent of the patentee, dated July 18, 1856, No. 1690, and consists in connecting the bolt of the lock with the nozzle thereof in which the key hole is made, thereby dispensing with the piece or knob, and affording additional security to the lock when not fastened by the key thereof.

LINDNER, E. *Improvements in cartridges and bullets, together with an apparatus for producing the same.* Dated Mar. 3, 1857. (No. 622.)

One of the improvements in cartridges consists in combining the paper for carrying or holding powder with or on to the bullet or ball. Another consists in casting on to the bullet a rod or pin, which projects beyond or even with the back of the cartridge, and carries either a percussion cap or a chamber containing some explosive composition which, on being struck by a needle, fires the cartridge. The improvement in bullets consists in forming them with rings of leather, thereby cleaning the barrel from which they are discharged. The apparatus consists of a mould fitted with a plunger, round which plunger the roll of paper is placed. This plunger descends in the mould to such extent that it exposes one of the ends of the roll to the lead to be subsequently poured in from the end of the mould opposite that at which the plunger is introduced, and which lead, when introduced, becomes fixed to the paper or other materials.

NEWTON, W. E. *Improved means for preventing the forgery or imitation of bank notes, bills, or certificates, cheques, bonds, deeds, and other like articles.* (A communication.) Dated Mar. 3, 1857. (No. 624.)

This relates to a method of producing blanks for bank notes, bills, &c., and consists in combining the form of note, &c., with a photographic or other like picture.

NEWTON, W. E. *A preparation of materials for coating roofs, or other portions of buildings, to render them impervious to wet.* (A communication.) Dated Mar. 3, 1857. (No. 626.)

This compound is peculiarly designed for roofing. The following are the ingredients: Caoutchouc dissolved in spirits of turpentine; gum shellac dissolved in alcohol; gutta percha dissolved in linseed oil; a mixture composed of pulverized glass, quicklime, and plaster of Paris; and another mixture, composed of vitrified glass, sand, flint, gravel, or any equivalent pulverized substances which will withstand the action of the atmosphere. To these are to be added naphtha or coal tar.

TAYLOR, W. *Improvements in the manufacture of iron and steel.* Dated Mar. 3, 1857. (No. 627.)

This consists in subjecting the molten metal to the action of compressed air, whilst the metal is contained in a rotary chamber constructed like a centrifugal separating apparatus, or hydro-extractor. The rotating chamber being set in motion at a very high velocity, the liquid metal supplied to it is spread out in a very thin film over the internal surface of the bowl, and thus the metal is fully exposed to the action of compressed air, which latter enters by a hole at the top, and may be either hot or cold. The same arrangement is available for granulating the metal in making steel.

MAIR, R. *Improvements in apparatus for protecting articles worn on the person.* Dated Mar. 3, 1857. (No. 629.)

In its application for protecting watches, this apparatus consists of two segments of thin steel, together embracing about three-fourths of the watch's periphery. These fit on to the lower portion of the watch, and outside them is a solid segmental piece, also of thin steel, embracing about one-half of the watch. Thus a steel case for the watch is formed, which the wearer secures by a cord or chain, and by an arrangement of springs the watch can be released when required.

BODMER, R. *Improvements in apparatus for steering ships.* (A communication.) Dated Mar. 4, 1857. (No. 630.)

This consists in the application of a second helm or rudder, to be used either conjointly with the ordinary helm or rudder, or separately; and also in the application of a helm or rudder at the stem or bow of the ship in addition to that at the stern.

RALSTON, G. *Improvements in fire-arms, and in balls or projectiles.* (A communication.) Dated Mar. 4, 1857. (No. 631.)

Breech-loading fire-arms are constructed as follows:—The breech closer or plug is combined with the lock, and the whole combination is arranged to move on an axis as a lever, so as to admit of charging the barrel at the breech when the combined parts are removed out of the way. A projection is fixed against which the hammer comes, and by the back end of the lock being pressed downward, the hammer is forced back and cocked. Tape priming is used, and the hammer cuts off a quantity each time of acting. In making balls or projectiles, in order to prevent leading of the barrel, the upper part of the bullet is conchoidal or conical. In forming the ball a projection is produced; a covering of paper is applied to the rear end of the ball, and is then forced into a die, which closes the projection down over the edge of the covering.

BROWN, T. *Improvements in capstans.* Dated Mar. 4, 1857. (No. 632.)

A central plate is applied below the body of a capstan and within the pawl rim. The lower part of the capstan body is made with a ring of internal teeth. The central plate carries the axes of pinions, the teeth of which take into the ring of teeth at the lower part of the body of the capstan. The head of the capstan is fixed to the axis, and the barrel may at any time be fixed to the head by bolts when it is desired that the barrel of the capstan should be revolved by the capstan bars. An arrangement is

also used for driving it by wheels and pinions.

HARTLEY, W., and T. H. FARRAR. *Improvements in looms.* Dated Mar. 4, 1857. (No. 633.)

This consists in giving a dwell to the slay lathe, healds, or shed, in the operation of weaving by all kinds of looms, by means of eccentric gearing, one of the wheels being placed on the ordinary cranked shaft, and the other on a stud or counter shaft to which the pulleys are attached.

NEWTON, W. E. *Certain improvements in machines for cutting standing crops.* (A communication.) Dated Mar. 4, 1857. (No. 636.)

This relates — 1. To the mechanism through which motion is imparted from the main driving wheel to the cutter bar of a reaping or mowing machine; and 2. To the employment of a stationary guard plate fitted to the main or driving wheel in such a manner as to exclude from the interior of the said wheel earth and other substances by which the mechanism within the wheel would be likely to become clogged. The invention cannot be described without engravings.

STEPHENS, J. *Improvements in paint-brushes, and similar kinds of brushes.* Dated March 4, 1857. (No. 638.)

This refers to securing the bristles of painters' brushes by means of an iron or steel band bent in the form of a hoop, and after soldering the junction, the patentee further rivets it to afford strength.

DYSON, G. W. *Tilting iron and steel, or any other malleable substance, by perpendicular motion.* Dated Mar. 5, 1857. (No. 639.)

To simplify or reduce the present mode of constructing tilts, compressed steam is used to increase the momentum of the falling hammer or upright shaft with projecting arms, which is raised by circular inclined arms revolving and passing under the brays or steelings, the hammer or upright shaft falling at the extremity of the lift of the circular inclined arms, thereby causing the stroke.

BRADSHAW, W. F. T. *Improvements in making palette and other like knives.* Dated Mar. 5, 1857. (No. 640.)

The patentee claims—1. Making the tang, bolster, and the hump of the palette in one part, the said part containing a deep groove at the top. 2. Making the handle, bolster, and the hump of the palette in one part. 3. Making the elastic or corresponding part of the palette in double lengths. 4. The mode of affixing the parts of the palette together by means of a deep groove formed at the top of the hump. 5. Making the deep groove solid at each side.

MUIR, W. *Improvements in generating steam for marine purposes.* Dated Mar. 5, 1857. (No. 641.)

This relates to heating the feed water of the boilers. The smoke box of the boiler is fitted with water pipes, so that they are exposed to the escaping heat from the furnace and flues. The feed water is supplied into one end of this arrangement of pipes, and escapes in a heated condition at the other end, in readiness for being fed into the boiler.

BARDIN, J. L. F. *A new mode of ornamentation.* Dated Mar. 5, 1857. (No. 642.)

This consists in peeling off from the natural feathers or quills the glossy elastic pellicle, cuticle, or coating, so as to make the said pellicle serviceable for purposes of ornamentation or utility.

HOLLAND, W. *A new or improved manufacture of runner notches and top notches for umbrellas and parasols.* Dated Mar. 5, 1857. (No. 644.)

This consists in manufacturing those parts of runner notches and top notches in which the wire lies, which constitute the axis of the joints, by raising the same together with the guard out of one piece of sheet metal by dies and pressure.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

PARKER, T. *Improvements in railway-wheels.* Dated Mar. 2, 1857. (No. 601.)

This consists in making the tyre and rim of the wheel in one piece, the spokes being afterwards welded into the inside thereof. There is no necessity for rivets or screw bolts.

JONES, F. D. *An improvement in the construction of the bits of horses.* (A communication.) Dated Mar. 2, 1857. (No. 602.)

The mouth of the bit is hollow, and pierced with small holes, thereby allowing to be introduced at the ends (closed with screws), honey, sugar, &c., which, in melting, go into the horse's mouth, refresh him, and permit of his making a long journey without eating.

SMITH, W. H., J. CADMAN, and J. CADMAN. *An improved method of manufacturing solid and hollow bricks, pipes, and other hollow and solid ware from clay, shale, and other mineral substances.* Dated Mar. 2, 1857. (No. 605.)

Instead of pugging and tempering the clay, and pressing it into shape while moist, it is taken direct from the heap, and is cut into blocks, and dried for use. In general, it is preferred to pulverise the clay, and then, without the addition of moisture, press the dry material into moulds, using either a screw press, steam or trip hammer, or rammers.

ANDERSON, J. *An improvement in the process generally termed "gathering," used in the manufacture of certain kinds of glass.* Dated Mar. 2, 1857. (No. 615.)

The object here is to provide more than one resting place for the rod or tube of the workman who "gathers," and an apparatus made of iron is attached to the furnace in connection with the working hole, so that the additional rests or fulcrums may be removed or replaced at pleasure.

SILEONI, G. *Obtaining starch from a plant called arum maculatum and arum italicum, and from all other roots and plants of the arum genus.* Dated Mar. 3, 1857. (No. 617.)

This consists in manufacturing starch from arum maculatum, and arum italicum, and from all roots of the same genus.

BROAD, J. *The application of artificial boards, or papier-maché or patent composition boards, composed (or partly so) of any vegetable fibre, and the like, either in its raw state or worked up from old substances, to friction washers of every description of wheeled carriages and cart axles, also for covering wing and dash irons, and forming heel-boards for Hansom cabs.* Dated Mar. 3, 1857. (No. 618.)

This consists in the adaptation of patent composition boards, manufactured from hemp, flax, old ropes, rags, and vegetable fibres, either in their raw state or worked up from old substances, as substitutes for leather for the before recited articles.

DANRE, G., P. F. V. MOUILLARD, and P. A. MERCIER. *An improved method of, and apparatus for, heating by gas.* Dated Mar. 3, 1857. (No. 621.)

This consists of an apparatus for heating by gas, in which the caloric produced is radiated similarly to that of incandescent fuel in ordinary furnaces. A number of gas-distributing pipes are mounted in the frame of the apparatus. On each pipe is a row of single jet burners, and above them a radiating plate is so placed with respect to the burners that, when the gas is lighted, each jet passes up into and through its corresponding hole in the plate. Other contrivances are included.

BALL, T. *An improvement in the manufacture of warp fabrics suitable for the manufacture of gloves.* Dated Mar. 3, 1857. (No. 623.)

The object here is so to manufacture glove fabrics in warp machines that the wrists of the gloves made therefrom may be of an ornamental character, or of a different texture to the other parts of the glove.

NEWTON, W. E. *Improved machinery for removing snow from railways.* (A communication.) Dated Mar. 3, 1857. (No. 625.)

This consists in an improvement on a snow plough, patented May 13, 1856, and described at p. 7 of vol. lxvi. of the *Mechanics' Magazine*, and has for its object the adjustment of the central vertical planes, so that the snow on the track, after being raised up to the level of the surrounding snow, can be all thrown over laterally on to either side.

ADAM, W., and J. S. TEMPLETON. *Improvements in weaving looped and pile fabrics.* Dated Mar. 3, 1857. (No. 628.)

This relates to the weaving of various looped and pile fabrics, wherein the wires over which the looped and pile surfaces are formed are passed through the reed of the loom.

TREEBY, T. W. G. *Improvements in sewers and gulleys, and outfall to sewers and gulleys, and of sewage.* Dated Mar. 4, 1857. (No. 634.)

This consists—1. Of an improvement on the inventor's patent, dated Nov. 13, 1856, for gulleys to sewers; next a sluice gate to outfall of sewer with caisson floats; next an improvement on the syphon for raising water and sewage from low levels.

ZENG, H. L. DE. *Improvements in marine and fog signals for reefs and other locations.* Dated Mar. 4, 1857. (No. 635.)

The inventor attaches a vertical shaft to the reef, and over the vertical shaft he places an eye formed in a lever, which lies nearly horizontal, and at the longer end of this lever is a float, and the eye is supported by a collar on the vertical shaft. From the motion of this lever and float a signal is given by striking a bell, or in any other manner.

HEINKE, J. W. *An improved construction of diving bell.* Dated Mar. 4, 1857. (No. 637.)

This relates to a diving-bell which will float on the water when not in use, and may be readily sunk when required for use. The bell is formed of a double casing divided into compartments, which receive respectively water to sink the bell and condensed air to supply the diver, who himself has the machine under his control.

SUTCLIFFE, S., and J. STOCKS. *Improvements in means or apparatus in connection with steam boiler and other furnaces to facilitate the consumption of smoke therein.* Dated Mar. 5, 1857. (No. 643.)

This relates to means for conducting air to the fire; also to the means for heating such air in its passage thereto. The air passes through a pipe enclosed in a steam chamber supplied by steam from the boiler, so that the air passing through such pipe may become highly heated before it reaches the fire. The pipe thence passes to the dead plate of the furnace, which is formed hollow, and with either a continuous channel or a

series of openings at that edge which is near the furnace bars, so that the heated air may thence flow direct on to the fire from the fuel.

ANSENS, A. *Improvements in moulds or forms for loaves of sugar.* Dated Mar. 5, 1857. (No. 646.)

The inventor makes his moulds square, with a cornice at their bottom part, from thence gradually tapering (but still with flat or square sides) till within a small space from the top; then the taper is changed to an angle till it reaches the top, where it becomes a diamond point with a hole in the centre to allow the syrup, which may still remain in the sugar after it is placed in the mould, to drain off.

TRAVIS, W. *Improvements in furnaces.* Dated Mar. 5, 1857. (No. 651.)

The inventor fixes plates of metal transversely under the fire-bars, for checking the direct current of air, and forcing it through the fire.

KING, J. *Improvements in the manufacture of boots and shoes.* (A communication.) Dated Mar. 6, 1857. (No. 656.)

This consists in mounting the insole upon a last, and completing the boot or shoe by machinery, the parts being cemented together successively.

FINDLATER, W., and W. KEETLEY. *An improvement or improvements in carriages.* Dated Mar. 6, 1857. (No. 658.)

This consists in so connecting the front wheels of carriages with the carriages that the said wheels may be of the same height as the hind wheels, and turn round without interfering with the body of the carriage. The front wheels are also brought much nearer the hind wheels than usual.

PROVISIONAL PROTECTIONS.

Dated September 2, 1857.

2300. Thomas Hardcastle, of Bradshaw, near Bolton-le-Moors, bleacher. Improvements in machinery for washing textile fabrics and fibrous substances.

Dated September 15, 1857.

2392. Thomas Archer, jun., of Dunston, Gateshead. Improvements in machinery for cutting off and heading lengths of metal, applicable to the manufacture of rivets and other articles.

Dated September 21, 1857.

2448. Elizabeth Burton West, of Kent-terrace, Regent's-park. Improvements in the manner of preparing and applying materials used in brewing to that purpose, and in the various processes and apparatus used in connection with the same, and for novel apparatus connected with the same. A communication.

Dated October 6, 1857.

2555. Edward Cavendy, of New York. An instrument in taking zenith observations at sea when the horizon is obscured), of any planet.

Dated October 10, 1857.

2598. George Frédéric Lombard, machinist, of Paris. Improvements in steam engines.

Dated October 19, 1857.

2664. Luigi De Cristoforis, of Lower Thames-street. An improvement on the system of vehicle wheels, to be called the De Cristoforis Conical Wheels.

2670. Benedict Barnard and Alfred Rosenthall, of Cheapside, manufacturers. A new ornamental fringe or fringed fabric, also the means of producing the same.

2672. Henry Wimball, of Aldermaston, Berks, brick manufacturer. Improvements in machinery or apparatus for the manufacture of bricks, tiles, pipes, and other articles of a similar nature.

2674. William Edward Newton, of Chancery-lane. Improvements in the manufacture of drawing rollers. A communication.

Dated October 20, 1857.

2678. Marc Antoine François Mennons, of Rue de l'Abbaye-Montmartre, Depart. de la Seine, France, clerk. An improved hydraulic press. A communication.

2680. Robert Atkinson, of Baildon, near Bradford, York, overlooker, and Thomas Brearey, of the same place, joiner. Improvements in loom pickers.

2682. Frances Windhausen, of Duderstadt, Hanover. Improvements in increasing the adhesion of the wheels of locomotive engines to rails when moist.

Dated October 21, 1857.

2688. Alfred Vincent Newton, of Chancery-lane. Improvements in the construction of sewing machines, and in the mode of operating such machinery. A communication.

Dated October 22, 1857.

2690. Charles Reeves, of Birmingham, manufacturer. Improvements in repeating or revolving fire-arms.

2692. James Hinks, of Birmingham, manufacturer. An improvement or improvements in stiffeners for wearing apparel.

2696. John Milne, of Royton, Lancaster, cotton spinner. Certain improvements in carding engines.

2698. David Hogg Saunders, of Rattray, N.B., manufacturer. Improvements in the preparation and manufacture of textile fabrics and materials.

Dated October 23, 1857.

2700. Thomas Rand and George Beckley, of Oxford-street, saddlers. An improvement in saddle-trees.

2702. Alexander Theophilus Blakely, of Tunbridge Wells, captain in the Royal Artillery. Improvements in laying submarine telegraphic cables.

Dated October 24, 1857.

2706. Alfred Vincent Newton, of Chancery-lane. An improvement in the process of making wrought iron beams or girders. A communication.

Dated October 26, 1857.

2711. James Fairclough, John Fairclough, and Joseph Cowan, of Liverpool, cabinet makers. Improvements for suspending and working window hangings and other drapery curtains.

2713. Charles de Clippele, of Brussels, gentleman. Improvements in the manufacture of boots and shoes, harness and driving straps, which improvements are applicable to uniting various materials together, and also for waterproofing.

2715. The Rev. John Walter Lee, of Chelmsford, M.A. Improvements in communicating between the different parts of railway trains.

2717. Aaron Marks, of London-wall, trimming manufacturer. An improved fastening for gloves and other articles.

Dated October 27, 1857.

2719. Charles Cadby, of Liquorpond-street, pianoforte manufacturer. Improvements in pianofortes.

2721. James Newall, of Bury, Lancaster, railway carriage builder. Improvements in railway breaks and signals, and in the machinery or apparatus for working the same.

2723. Marc Antoine François Mennons, of Paris. An improved varnish. A communication.

Dated October 28, 1857.

2725. William Irlam, of the Gibraltar Works, Newton Heath, near Manchester, engineer. Improvements in wrought iron railway chairs, sleepers, and crossings.

2727. John Addison, of the H. E. I. C.'s Army, Bombay Presidency. Discovering and destroying hydrogen or carburetted hydrogen gas and other gases in coal mines, dwelling-houses, or other places.

2729. William Smith, of Salisbury-street, Adelphi. Improvements in couplings or connections for shafts. A communication from M. Blondel, of Déville, France.

2731. Abel West, of Wormley Ring, Hertford. Improvements in the manufacture of candles.

2733. George Shillibeer, of Commercial-place, City-road, funeral carriage proprietor, and George Giles, of Gray's-inn-square, gentleman. Improvements in omnibuses.

2735. William Clark, of Chancery-lane. An improvement in rails for railways. A communication.

2737. William Clark, of Chancery-lane. Certain improvements in machinery for carding cotton, wool, and other fibrous substances. A communication.

2739. Elizabeth McDowall, of Johnstone, N.B., widow. Improvements in steam hammers. A communication by J. McDowall, deceased.

2741. Henry Taylor, of Staley Bridge, Lancaster, tin-plate worker. An improvement in the "cans" employed in connection with machinery for preparing cotton and other fibrous materials for spinning.

2743. Robert Alexander Ronald, of Paisley, N.B., shawl manufacturer. Improvements in the manufacture of shawls.

Dated October 29, 1857.

2745. William Delf, jun., of Great Bentley, Essex, gentleman. Improvements in ploughs.

2747. Pietro Feloj, of Holborn-hill, mechanic. The improvement of an illuminating reflector of light from gas, oil, or candle.

2749. David Allison, of Manchester, pattern maker, and John Livingston, of the same place, mechanic. Improvements in machinery or apparatus for regulating the weight or pressure to top rollers used in spinning or preparing fibrous materials to be spun.

2751. Jonas Craven, of Bradford, York, designer. Improvements in machinery or apparatus used in weaving.

2753. George William Robinson, of Barton-on-Humber. Improvements in clod crushing rollers.

Dated October 30, 1857.

2755. Joseph Boyes Fraser, of Kenilworth, Warwick, mechanical engineer. An improvement or improvements in lubricating shafts, axles, screws, and other articles requiring lubrication.

2757. William Clark, of Chancery-lane. Improvements in tackle blocks. A communication.

2759. William Harwood, of Mendlesham, Suffolk, Esq. Improvements in reaping machines.

2761. John Lawson, of Leeds. Improvements in machinery for roving flax and other fibrous substances. Partly a communication.

2763. Samuel Knowles, of Tottington Mill, near Bury, Lancaster, calico printer. Improvements in "dunging" fabrics preparatory to dyeing.

Dated October 31, 1857.

2765. George Bell Galloway, of Basinghall-street, engineer. Improvements in the construction of merchant ships and other vessels, in motive powers, propulsion, and boiler furnaces.

2767. James Owen, of Worsley, Lancaster, carpenter. Certain improvements in machinery or apparatus for the prevention of accidents, applicable to hoisting and other lifting machines.

2769. Richard Martin, Ebenezer Hall, and Joshua Hall, silver platers, of Shrewsbury Works, Sheffield. Improvements in steam hammers.

2771. Richard Archibald Brooman, of 166, Fleet street, London, E.C., patent agent. Improvements in the construction of boats. A communication.

2772. Johann Julius Schuessel, of Breslau, Prussia, and Peter Julius Thouret, of Berlin, merchants. The manufacture of a composition which will render inflammable materials incombustible.

2773. William, James, and John Woodhead, of Eccleshill, near Leeds, tube and tile manufacturers. Improvements in the manufacture of kiln tiles, and in the machinery or apparatus employed therein.

2775. Prodromos B. Kyishogloo, of Constantinople. Improvements in obtaining and applying motive power.

2777. George Hallen Cottam and Henry Richard Cottam, of the St. Pancras Iron Works, Old St. Pancras-road. Improvements in stable fittings.

Dated November 2, 1857.

2779. Robert Kirkman, of Saint Helen's, Lancaster, watch movement maker. Improvements in the fusees of lever and other watches.

2781. Eugene Murray, contractor, of Woolwich. Preventing accidents on railways.

2783. Charles Iles, of Birmingham, manufacturer. Improvements in wardrobes or similar receptacles for articles of dress, and in stands, frames, and pins for holding or suspending articles of dress.

2785. James Apperly, cloth manufacturer, and William Clissold, engineer, both of Dudbridge, Gloucester. Improvements applicable to carding and condensing engines.

Dated November 3, 1857.

2789. James Edward Boyd, of Lewisham, gentleman. Improvements in skates.

2791. David Harcourt, of Lozells, Birmingham, crank chain maker. Improvements in wrenches.

2793. Ludolph Wappenstein, of Manchester, engraver. Improvements in doctors or scrapers used for cleaning engraved surfaces.

2795. William Edward Newton, of Chancery-lane. Improved machinery for cutting files. A communication.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," November* 17, 1857.)

1870. J. Smith. Improvements in flour dressing machines.

1886. W. Smith. Improvements in horse hoes and drills.

1891. M. Henry. Improvements in railways and wagons used therewith, in loading and discharging coals, stones, ballast, earth, and other materials. A communication.

1892. W. E. Jones. An improvement in trees of riding saddles.

1893. J. T. Pitman. A conical tent. A communication.

1895. T. F. Henley. Improvements in the preparation or manufacture of certain beverages or liquors of the nature and character of home-made wines, and in the means of obtaining the same.

1903. R. Moore. Improvements applicable to navigable vessels, and the propelling thereof.

1905. C. P. Stewart and D. G. Hope. Improvements in the valve gear of locomotive and other engines.

1906. J. H. Swan. Improved machinery and steam engine for crushing quartz and other hard substances, and for amalgamating.

1908. J. J. C. de Clerville. Improvements in the manufacture of oil cloth and imitation leather. A communication.

1912. W. Mann. An improved arrangement of steam boiler gauge cocks, and registering apparatus connected therewith.

1922. R. A. Brooman. A method of and apparatuses for scouring or extracting oil and grease from wools and woollen fabrics, and for extracting gum and gummy matter from silk. A communication.

1931. E. Primard. Improvements in treating auriferous, argentiferous or other metallic ores.

1932. W. J. T. Smith and F. Talbot. An improvement or improvements in hair pins.

1940. M. McKay and H. F. Osman. Improvements in apparatus for securing the points of railway switches.

1941. H. Starr. Improvements in hinges. A communication.

1943. N. Williams and T. Williams. Improvements in the form and arrangement of the driving gear of thrashing machines, and in the form and mode of applying the straw shakers to such said machines.

1947. W. E. Newton. Improvements in the manufacture or reduction of platinum. A communication.

1950. S. Nye. Improvements in chaff cutting machines.

1971. J. H. Johnson. Improvements in sewing machines. A communication.

1976. G. Defis. Certain improvements in preventing incrustation in boilers.

2026. E. Wilson. An improved method of consuming smoke.

2041. N. Saintard. An improved break for railway and other carriages.

2127. J. Parker. Improvements in the means of supplying or feeding steam boilers with water, whereby a great saving of fuel is effected.

2351. J. Eastwood and S. Lloyd, jun. Improvements in machinery for shearing iron and other metals.

2500. S. Smith. Certain improvements in coffins. A communication.

2524. S. D. Hamilton. Improvements in Jacquard machinery. A communication.

2629. J. Middleton and W. Rylance. The application of a certain metal or material to the manufacture of shuttles, bobbins, and tubes.

2682. F. Windhausen. Improvements in increasing the adhesion of the wheels of locomotive engines to rails when moist.

2697. T. Cardwell. Improvements in machinery for compressing cotton and other articles.

2698. D. H. Saunders. Improvements in the preparation and manufacture of textile fabrics and materials.

2739. E. M'Dowall. Improvements in steam hammers. A communication.

2763. S. Knowles. Improvements in "dunging" fabrics preparatory to dyeing.

2772. J. J. Schuessel and P. J. Thouret. The manufacture of a composition which will render inflammable materials incombustible.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2399. Peter Armand Lecomte de Fontainemoreau.
2402. Joseph Armstrong.
2408. Lancelot Kirkup.
2423. James Buchanan.
2425. Peter Knowles and Edward Kirby.
2426. Robert Wilson.
2429. Samuel Henton.
2432. William Hann.
2502. John Clarke.

LIST OF SEALED PATENTS.

Sealed November 13, 1857.

1359. William Sissons and Peter White.
1367. Daniel Reading.
1369. Charles Bartholomew and John Heptinstall.
1370. Joseph Aisiewood.
1378. Edward Gripper.
1383. Francis Parker.
1386. Henry Jones.
1398. James Apperly and William Clissold.
1403. Charles Reeves.
1495. Edward Welch.
1513. Thomas Hart.
1517. Thomas Willis and George Chell.
1541. John Aiken Salmon.
1607. John Robertson.
1697. Henry Brinsmead.
2329. Peter Armand Lecomte de Fontainemoreau.
2349. Leon Louis Honoré Bertou.

Sealed November 17, 1857.

1394. Rudolph Bodmer.
1400. Charles Fréderic Vasserot.
1405. Julius Friedrich Philipp Ludwig Von Sparre.
1412. Charles Weightman Harrison.
1419. George Sharp and William Elder.
1421. Elijah Aldis.
1422. John Harrisson.
1450. Samuel Fox.
1490. William Holland.
1506. Thomas Grahame.
1507. Thomas Taylorson Jopling.
1508. Edward Paige Griffiths.

1520. James Merrylees.
1798. William Crook, Gilbert Rushton, and Joseph Crowther.
1961. Thomas Mosdell Smith.
2018. Henry Doulton.
2053. William Hirst.
2136. George Collier, William Noble, and Ward Holroyd.
2391. Gerd Jacob Bensen.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

Several communications stand over till next week, some of which reached us too late for insertion in this Number.

A correspondent, "C.," complains, first, of the insertion in our last Number of the article "A Voyage in the Air," apparently because he "never felt more surprised" than when he read it; and secondly, of our having failed to omit what he calls the "dreadfully impious expression" which Gavarni is said to have uttered. We can only say, we do not regret the publication of the article, because it can do our readers no harm to know what the Frenchmen say they have done; and we see no necessary "impiety" in Gavarni's expression. Many enlightened people (the late Dr. Dick, we believe, among others) have speculated upon the probability of there being a great, effulgent, central sphere in the universe, wherein the Deity may fitly dwell in person; and it appears to us that the belief in the existence of such a "throne of God" is not more "impious," although it is certainly more absurd, than the speculation of such "Christian philosophers."

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

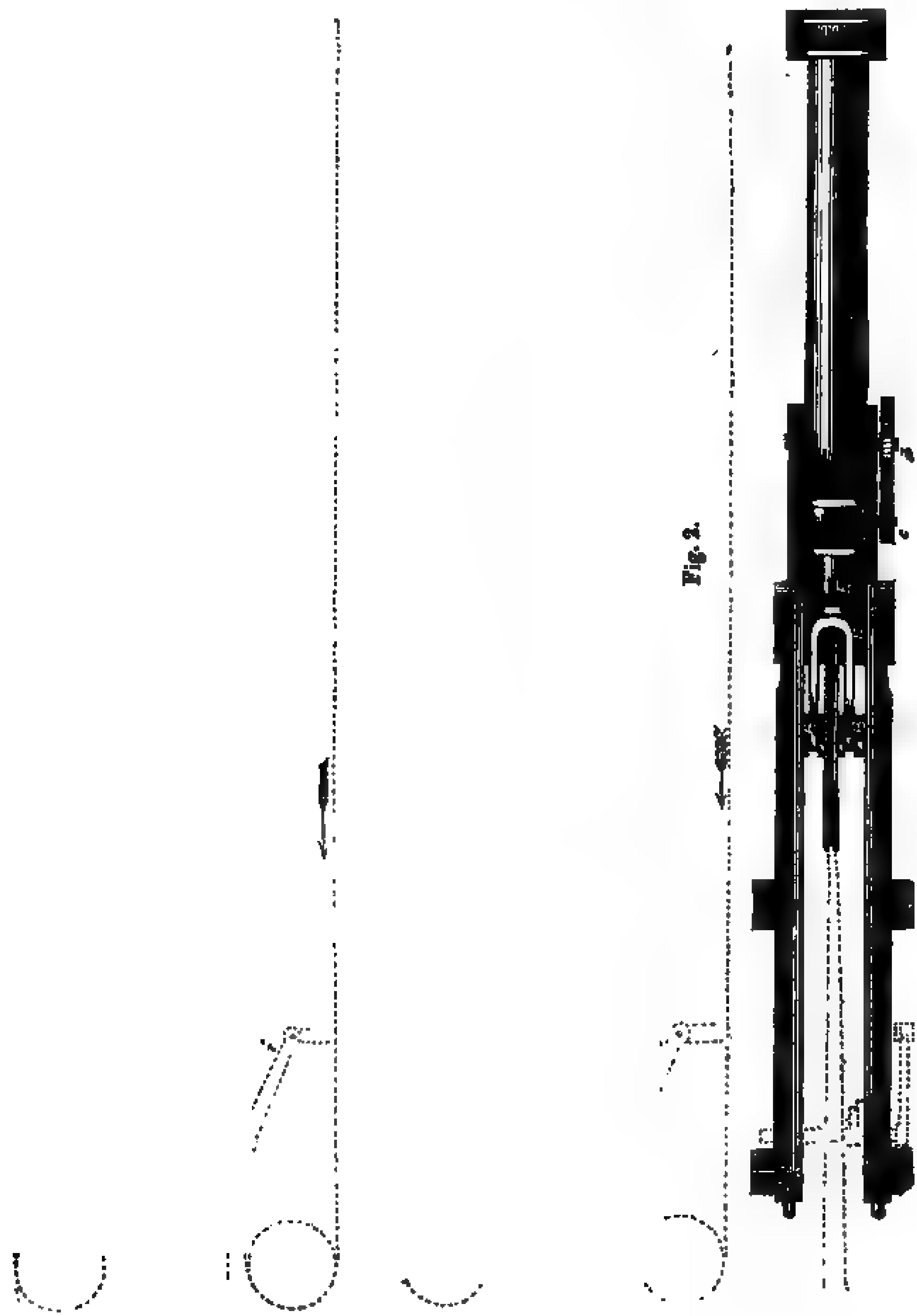
LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1790.] SATURDAY, NOVEMBER 28, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

BRIGHT'S PATENT IMPROVEMENTS IN LAYING DOWN SUBMARINE CABLES.



BRIGHT'S PATENT IMPROVEMENTS IN LAYING DOWN SUBMARINE CABLES.

Among the numerous inventions recently patented for the above purpose, none at present possesses more interest than those patented by Mr. C. T. Bright, the engineer of the Atlantic Telegraph Company. This gentleman has patented two inventions, one exclusively his own, the other made in conjunction with Mr. Charles De Bergue. These we propose to lay before our readers, the former in the present article, and the latter in a succeeding number.

The first part of Mr. Bright's invention consists in measuring and indicating the strain exerted by a submarine telegraph cable while being submerged, in order that a fracture of the cable may be guarded against, by decreasing the power employed to retard the paying out of the cable, should the strain (from the pitching of the vessel, the depth of water, the force of currents, or other causes) approach the highest point the cable is calculated with safety to bear with respect to the speed at which it is being paid out over the paying out apparatus. The machinery which he employs for these purposes becomes a compensating regulator. This part of the invention also consists in causing the strain, when it has so reached its highest point, to release a break strap or other retarding agent connected with the paying out apparatus, when the cable will be free to run faster over the paying out apparatus, and thereby prevent fracture. These improvements were not adopted in the laying of the Atlantic cable, the haste with which the attempt was made being too great to admit of the necessary apparatus being fitted.

Fig. 1 of the engravings on the preceding page is an external elevation, partly in section, and fig. 2 a plan of a measuring and indicating apparatus, constructed according to this invention. A A is a frame, between the upper and lower portions of which the blocks, B B, forming the bearings for the axis of a grooved pulley, C, are free to slide; D is a fork, connecting the axis of the pulley with a piston rod, E; F is a case or cylinder, containing some retarding agent or power, which may be in the form of coiled metal springs, or springs of vulcanized rubber; or the cylinder may be fitted for containing air or steam; or other form of springs may be fitted in such manner that the strain of the cable passing over the pulley, C, may be measured by the extent or degree to which a piston connected to the piston rod, E, will compress the springs or other elastic medium contained in the case or cylinder, F. Again, instead of the piston being made to compress an elastic medium, the strain may be measured by the extent to which it will draw out or separate elliptical or other springs, or to which it will raise weights connected to the outer end of the piston rod. The indicating of the strain is effected through a toothed rack, *a*, upon or connected to the piston rod, according to the elastic resisting medium employed, which rack works a toothed wheel, *b*, upon the axis of which is a pinion, *c*, which gears into and drives another toothed wheel, *d*, upon the axis of which, prolonged outside the case of the indicating apparatus, fig. 3, is the pointer, *e*, which moves in front of the dial, *f*.

The apparatus just described may be employed for the purpose of measuring and indicating only, and upon the maximum safe strain being attained, the break strap or other retarding agent applied to the paying out drums may be released by hand. But in order to cause the strain by its own power, when it has attained the highest point the cable is calculated with safety to bear, as aforesaid, to release the cable, and so prevent any fracture thereof, Mr. Bright connects one arm of a cranked lever, *g*, shown in dotted lines, figs. 1 and 2, to a block, *h*, free to slide in the groove in the frame, A A, near the extreme end of the course of the sliding pulley, C, and from the other arm, *i*, of the lever a rod, chain, or cord is carried to connect it with the break strap (or other retarding agent applied to the paying out apparatus) in such manner that upon the block, *h*, being pressed upon by one of the blocks of the sliding pulley, C, the lever shall act upon and release the break strap, when the cable will be free to run faster from the paying out apparatus, whereby the strain will be lessened, when the break strap may be again applied. Mr. Bright does not limit himself to the precise indicating apparatus shown, nor to the cranked lever for acting upon and releasing the retarding agent, as various well-known simple mechanical arrangements for effecting the same objects may be readily adopted.

The second part of this invention consists in machinery for effecting the regular unwinding of large coils of telegraph cable, by placing in the centre or eye of the coil an upright shaft, carrying one or more sheaves or guides, by which the cable is taken hold of and guided from the coil to the inner edge of one of the sheaves which is in a line with the centre of the coil. This part of the invention does not require engravings to illustrate it.

LUNGLEY'S PATENT DRY DOCKS AND BASINS.

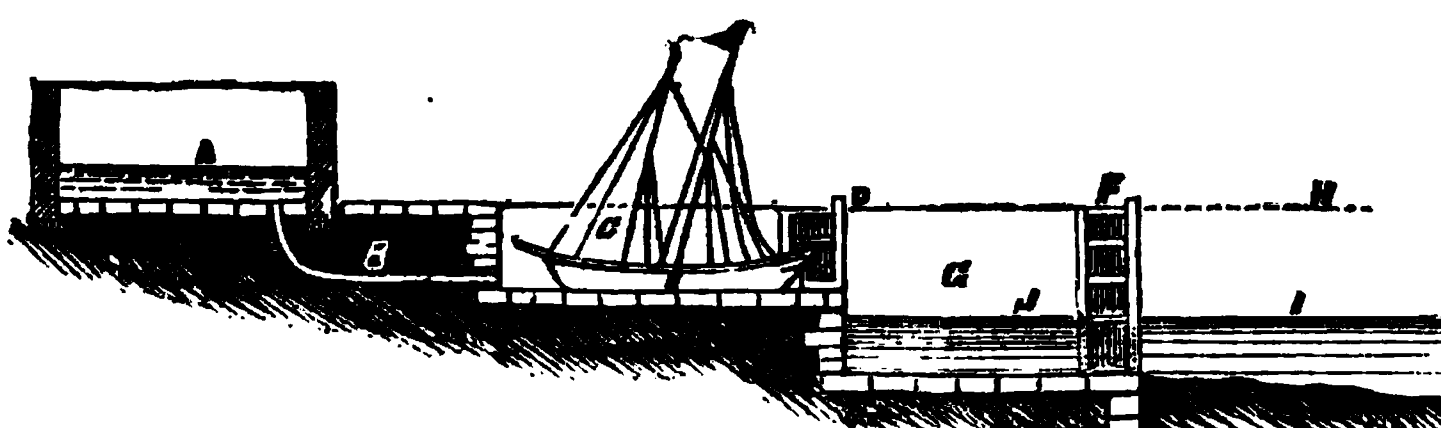
Mr. C. Lungley, the ship-builder of Deptford-green Dockyard, has obtained a patent for an invention which he describes in the following terms:

"The object of this invention is so to construct dry docks and basins for receiving vessels that are to be stowed away, or to be unladen, or repaired, that such vessels may enter therein at all states of the tide, and be left high and dry, above the level of the sea or river from which they were floated. To this end, I make use of the natural level of the land (when that is suitable), and build up the dry docks or basins thereon in any suitable manner. When I construct a series of dry docks, I connect them all with a common reservoir or basin, arranging them by preference in groups, the docks composing which will lie parallel with each other. These docks I cut off severally from the reservoir by means of gates or caissons, and I maintain the water in the reservoir at a spring tide, or an artificial height, by suitable pumping engines. The reservoir I connect with the river or sea, by means of an outer dock or channel, provided with double gates or caissons, so as to allow of an artificial height of water being made therein."

Many of our readers will see at once that this invention involves precisely the same principle as many of the docks at present known, and differs from them only in the fact that Mr. Lungley arranges a number of docks and a basin in the manner in which single docks have been heretofore used.

For example, let us take the case of Captain Caldwell's dock, represented in the annexed engraving, fig. 1, observing that in

Fig. 1.



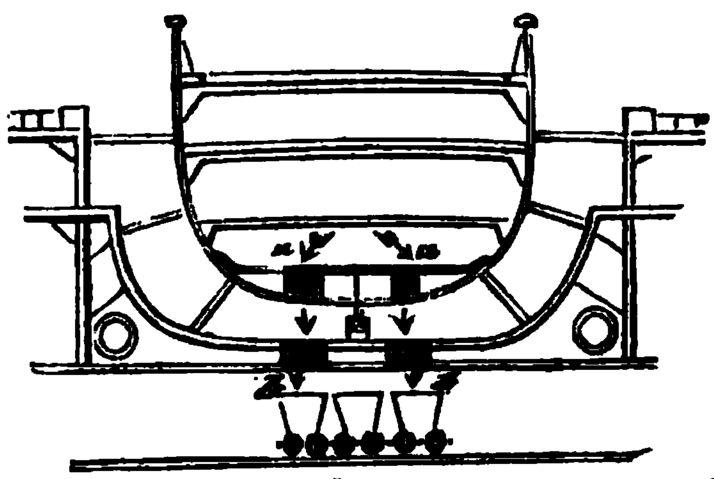
this case the high level dock is supplied with water from a reservoir instead of a pumping engine, as in Mr. Lungley's. In this dock of Caldwell's, A is the reservoir, B, a pipe communicating with the inner dock, C, of which D is the inner gate, and F the outer gate. E is a vessel in the dock. G is an outer dock, H the ground level, I the level of water in the harbour or river, and J the level of it in the dock, which (as the water is supposed in the engraving to have been let out of the dock) is the same as I. We need not use many words in describing the action of this dock. In docking a vessel, she first enters the lower dock, the gates of which are then closed. Water is then let into the outer dock to a sufficient height, the gates between the two docks are opened, and the ship is drawn into the inner dock. The gates of the inner dock are then closed, and the water allowed to run out, leaving the ship dry.

Now, if, in this example, we put a basin surrounded by docks in the place of the inner dock, C, we have, as it appears to us, precisely Mr. Lungley's arrangement. We need scarcely, perhaps, have taken the trouble to point out the familiarity of the principle adopted by Mr. Lungley; we do so simply to prevent misapprehension. We are bound to say, however, that it is somewhat bold of Mr. Lungley to claim, as he does, "Constructing dry docks at a high level, and affording the access of ships thereto at all times of the tide, by means of an outer dock, and an inner dock or basin, the water level in which is to be artificially raised in the manner, and for the purpose, above set forth." Why should Mr. Lungley claim Captain Caldwell's dock, the Sebastopol Docks, and other existing docks which would come within the scope of his claim? We ought to state that by building docks as he proposes, Mr. Lungley expects to avoid, and would avoid, the disadvantages of striking upon springs of water, and of affording an opportunity for water accumulating in the dock when it is required to be dry.

In his final specification, Mr. Lungley proposes to introduce the following mode of unloading vessels, whereby a large amount of labour would be saved in discharging certain kinds of cargoes. Fig. 2 is a sectional elevation of a dry dock, which will explain the

improvement. He proposes to provide vessels which are intended to carry coals, and other substances capable of being discharged in

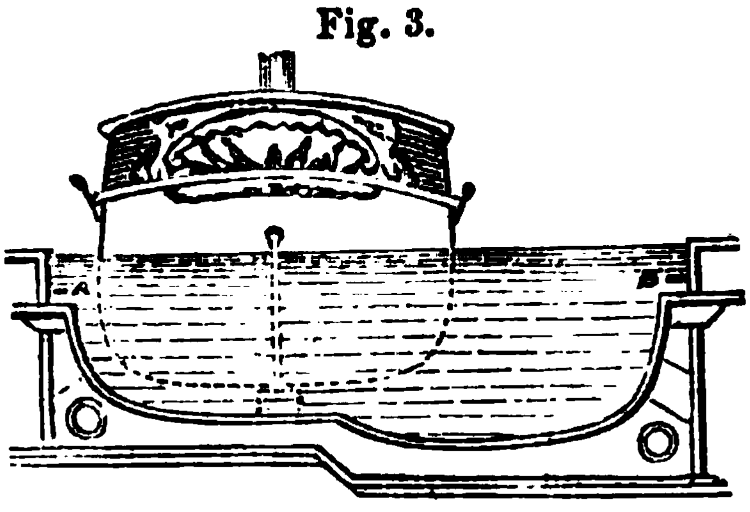
Fig. 2.



a similar manner, with holes or ports in the bottom, as shown at *a a*, which are ordinarily to be securely closed after the manner of fastening down the man holes of steam boilers. In the bottom of the dry dock, corresponding holes, *b b*, are made, which are likewise to be closed water tight when not used. Below the range of dry docks is formed a tunnel, the crown of which is pierced by the holes in the bottom of the docks. In the tunnel is laid down a railway to receive a series of trucks, which, when a vessel is to be discharged of its cargo, are brought under the discharging ports in succession, and filled directly from the ship, the coals running down a shute from the hold of the vessel to the trucks below.

Fig. 3 shows another modification of the improved dry docks in cross section. The docks are so constructed as to allow a ship

Fig. 3.



to come alongside of a set of blocks, or a raised bottom, and then be lifted on to the raised blocks or bottom provided for its reception. When at A B, the water is at the proper height for floating the vessel into the deep part of the dock on the right-hand side. When it has entered the dock, the gates are closed, and the water level is raised by pumps to the full height, as shown. The vessel is then floated over the raised blocks and shored up, and when properly secured, the water is run off, and the vessel is left high and dry.

THE IRON TRADE.

(FROM OUR CORRESPONDENT AT WOLVERHAMPTON.)

Gloomy Month—Failures—Board of Trade Returns—Prosperity Checked—Our Customers for Machinery — Improvement in American Affairs—Debts Safe—Paucity of Home Orders—Further Suspensions Feared —The Firms who have Suspended—Meetings of Creditors — Paper Transactions—Prices Nominal—The Labour Market—Hope Brightening.

Our tale this month must be a gloomy one, partaking of all our feelings here. With a closed bank, with creditors summoned by seven different ironmaking firms, scanty remittances from America, and orders suspended, with few or no orders coming in for the home supply, how can it be otherwise?

The effects upon the iron trade of the monetary panic in America were quickly perceptible. The following are the comparative figures for 1856 and 1857, showing the value of the iron sent out by the United Kingdom in the month ending with September in each of the two years mentioned. We are unable to use the returns for October, because they are not published until just after we go to press.

	1856.	1857.
Pig iron	129,637	152,179
Bar and rod iron	501,386	512,879
Cast iron............	87,121	54,298
Wrought iron	322,883	388,437
Steel................	65,242	66,542
Machinery: Steam engines	49,163	106,149
Machinery: other sorts	217,279	339,035

Among the imports we find that in the month of September, 1856, 8,837 tons of iron were admitted against 12,023 tons; the import of steel, which in the former period was 126 tons, was in the latter 484 tons. Although the figures appear pretty favourable, they display an absence of advance to an extent that they would have attained to, had not the difficulties which now prevail set in.

The exportation of steam-engines has nearly doubled; the increased demand was chiefly from Canada, Australia, India, Russia, and Spain; there were no shipments to Sardinia, but Denmark again gave a small order. The increased demands for other kinds of machinery came chiefly from Russia, Holland, France, Spain, and Australia. The improvement in bar and rod iron was small, owing to the general decline of orders, the Canadian and Australian alone showing any increase. Those colonies, however, took enough to raise the exports to the figures shown in the table. The cast-iron trade

suffered a reverse; Egypt alone increased her orders, and the exports to that country are too inconsiderable to counterbalance a largely diminished exportation to all others. The demand for wrought iron was increased chiefly from the United States and Australia.

Happily, the American difficulties are being now fast removed, and that is the only cheering feature in the aspect of affairs here. Remittances have begun to come over in small amounts; and the agents' letters are full of assurance that there was no real ground for the commercial upheavings and the violent tossing to and fro which the trading community in that country have just been subjected to. The greater portion of the debts, principals here are assured are good; and it is said that so soon as planters and farmers will bring down their produce to the seaboard, the merchants are ready to buy it. Only a few days ago, a distinguished master in the iron trade told us in this town that he would not take 17*s.* 6*d.* in the pound for his American debts. In a few months a brisk demand will spring up in the United States. It should not, however, be forgotten, that the Americans, at the time of the last advices, had not received the intelligence of the English failures.

Our opening paragraph is a summary of the state of affairs. Very few orders are coming in from the home market, and it is feared that one or more firms will, in consequence, have to follow the example set them by other firms, and suspend.

The firms who, up to the time of our writing, had issued circulars, were Messrs. W. Riley and Sons; F. C. Perry and Co.; Rose, Higgins, and Rose; the Wolverhampton Iron Company; Fletcher, Rose, and Co., and T. Morris and Sons. Messrs. Riley's creditors will meet to-day (Dec. 1); those of Mr. Perry met on Saturday, Nov. 21, at Wolverhampton. The balance sheet showed 10s. on the side of the creditors; but the figures had necessarily been so hastily put together, that a committee was appointed to revise it, and, if possible, ascertain the value of the property which Mr. Perry held. Mr. Perry has sacrificed himself to transactions to an unsafe extent in bills now proved to be of little worth. The same thing, for the greater part, has shut up the rest, and, lastly, the ironmasters' bank at Wolverhampton. Messrs. Motteram, Deeley, and Co.'s creditors met at Wolverhampton on the 24th of Nov. The new creditors (for the firm has before failed), expect to realize 7*s.* 6*d.* in the pound.

Prices are merely nominal, both for pig and also malleable iron. Some blast furnaces are being blown out to keep down the make; and malleable iron firms are putting portions of their machinery out of gear.

The aspect of the labour market is otherwise than cheering, and there have been fears of a disturbance by the unemployed.

Hope is beginning to revive the spirits of the people in Wolverhampton, and, faintly, the iron-making district around that town. As we are about to close our letter, we learn that there is a well-grounded probability of the Wolverhampton bank resuming its operations forthwith.

MACHINERY FOR WORKING WOOD.

At the meeting of the Institution of Civil Engineers, Nov. 17, 1857, a paper "On the Conversion of Wood by Machinery" was read by Mr. G. L. Molesworth, Assoc. Inst. C.E.

In briefly glancing at the history of wood conversion, the author noticed the early application of machinery for the purpose, and also the introduction of the circular saw, the planing machine, and the band saw. The inventions of Bentham and Brunel were mentioned as having contributed largely to the advance of this branch of engineering. A comparison was then drawn, showing the more rapid progress of wood conversion in America than in England. This was ascribed to the greater cheapness of material and the scarcity of skilled labour in the former country, which gave a stimulus to invention, whilst in England the case was different. The material was comparatively expensive, and skilled artizans were abundant. Nor was the system of the subdivision of labour as yet fully carried out, the conversion of wood being hitherto in the hands of a class who could not employ much capital in machinery, or keep it constantly at work to the greatest advantage, even when they had it; and, at the same time, the prejudices of foremen and the combinations of workmen had operated powerfully against the introduction of new machines. Many of the machines of English construction had been of too costly a character, and in designing them sufficient attention had not been given to economy of the converted material. The cheap and simple character of the American machines was mentioned, and some of their characteristic details were described. An account of the different kinds of saws, as well as the form of teeth, the modes of setting them, and the velocities adopted in England and in America was given, and the silent friction feed, the American "Muley" saw, the author's arrangement of a revolving wedge, the methods of cross cutting, the pendulous saw, Macdowall's circular saw, the pendulum, the dished saw, the scroll and the

band saws, were briefly described; and mention was made of Mr. Exall's improvements in the band saw. The author then proceeded to enumerate the varieties of planing machines.

It was argued that, in order to produce good work, the conditions to be fulfilled were a high velocity of cutters, not too rapid travel of work, a solid bed to cut against, the working parts well balanced, the bearings steady, and the angles of the cutters properly determined. The author condemned the usual empirical method of determining the angle of the cutters, and insisted upon the desirability of taking into consideration the nature of the material, as well as the character of the work, and the diameter of the cutters in fixing upon the proper angle. He then stated those angles which he considered best for different kinds of wood and varieties of work. Brief descriptions and diagrams, illustrative of the principles of several processes and machines, were then given. The different boring tools were then noticed, and an account given of the modes of mortising, by giving motion to the chisel and reversing it, as well as the forms of mortising chisels, and the devices for clearing the mortise of chips. The subject of timber bending was briefly mentioned. In conclusion, the author considered that wood conversion was not fully developed in this country, and hoped that this paper would direct the attention and ingenuity of engineers to the subject.

A COMBINED OIL CAN AND LANTERN.

One of the most useful articles recently patented is a combined oil can and lantern, the invention of an American engineer. The object of the combination is to enable the attendant to see where to apply the oil to the required part of the machinery at night, or where the machinery is located in a dark place. It is especially adapted for use in locomotives and steamers, because as the man carries in one hand both the oil and the light, the other is left free to hold on with, as is necessary in machinery constantly in a state of motion. The annexed engraving represents a section of the combined oil can and lamp, *a* being the body of the can, shaped as may be most convenient, having its pouring spout, *c*, handle, *b*, and filling hole, *g*, as usual. Upon the top and over the division plate is formed the lamp body, *d*, with wick-tube and screw stopper, *e*, as usual, over which may be appropriately placed a shade. The back of this shade is represented as opaque to screen the light from the face of the person using the can, and it is allowed to emerge only forward through the transparent portion of the screen, *f*. In this way, the rays will be thrown upon and about the spout; consequently, wherever that is pointed, the spot will be illuminated, and hence the oil may be poured upon the exact place required, and waste thus avoided.

THE "LEVIATHAN."

Wednesday, Nov. 25, 1857.

The primary efforts of Mr. Brunel in his last attempt to launch this ship—the failure of which was announced in our last number —and his subsequent efforts also, are directed to the placing of the ship square upon her ways, by getting the bow launched to the same extent as the stern. To effect this is his great difficulty. His want of success in endeavouring to overcome it, shows how deeply the first failure is to be lamented. And further, we may state that this is precisely the evil which, as men experienced in the side-launching of ships knew, from the first threatened Mr. Brunel. From the difference in the amount of friction upon the two ways, resulting from the difference of the weights respectively sustained by them, there results a tendency for the cradles to move with unequal velocities down them, and this tendency it is most difficult to control. One very excellent contrivance for checking it may be observed on a smaller scale at the Gunboat Yard, Gosport, where parts of the cradles are prolonged along the rails, and furnished with rigid side guides to keep them in a proper course. But whether such an arrangement could have been applied to the *Leviathan* is very questionable. The whole difficulty of the case, however, proves what an imprudent thing it was to erect such a structure as this ship upon the bank of a narrow and crowded river, and certainly reflects most strongly upon one or other of Mr. Brunel's qualities, especially if it be true that he was at the outset urged to a contrary step by eminent members of the Institution of Civil Engineers. It will be well for both the Company and the public

if the vessel is ultimately floated without still greater disasters than have yet occurred. We believe we are not wrong in attributing to Mr. Brunel the responsibility of building the ship where she is.

The following are the recent facts respecting the launch. On Thursday, the 19th, at ten minutes to one, the order was given to commence pumping at the foremost hydraulic presses only, Mr. Brunel wishing, as we have said, to get the bow down square with the stern, a wish that, we fear, will be some time before it is gratified, as it will probably require much greater skill and power to square her than to launch her. It very soon became evident that the piles forming the buttresses were giving way. The midship chains were then hove taut; and lastly, the foremost engine was set to work. After a short time, during which the only sounds heard were the creaking of the timber, and the puffing of the engine, something suddenly gave way forward, the barge bounded several feet toward the ship, and all became still. An examination was then made, and it was found that the piles, in spite of spurs and ties, had gone back about eight inches, and that the ship had not moved. One of the after presses was then tried, and the piles there also gave way. Orders were then given to drive more piles at the back of those already in, and this operation has been going on night and day ever since, and is not yet quite complete. It has been found that it was a shackle bolt belonging to the City moorings that broke. The small chain falls used at the first trial were removed, and in their stead a large single block was placed in the barge, and connected with the City moorings by a piece of government 2¼-inch chain cable of Brown and Lenox's make. Another block was fixed to the ship, and then a piece of smaller chain was rove through the blocks, and carried to the steam winch. An additional chain is now being placed at each end, and if all goes well, we may expect another attempt in a few days.

THE ATLANTIC TELEGRAPH CABLE.

The failure of the recent attempt to lay the Atlantic cable was made the occasion of many unseemly reflections upon the professional reputation of Mr. C. T. Bright, the engineer of the company, most of which were conspicuously unjust, and without foundation. A statement, however, which was made by Professor Morse, who was on board at the time, seemed to have a better foundation. It was to the effect that Mr. Bright persisted in adding force to the brakes, when the prudence of doing so was questioned. This statement induced Mr. Bright to write Professor Morse upon the subject, giving it contradiction; and we now find that Professor Morse admits having made it solely upon the representations of others — a very reprehensible thing to do, in our judgment—being himself confined to his cabin at the time, and that he has sent an explanation to this effect to the American journals. Mr. Bright's own account of the matter, which we feel it our duty to give, is as follows:

"I am quite willing to take the reproach to myself which always belongs to a want of success in any enterprise; but will you allow me to correct your narrative? I had been on deck all night: the brakes had been regulated by myself or Mr. Clifford, one of the assistant engineers on board, the whole time. The strain which was on the cable when it parted, had been on for some time; I gave the man at the brakes no orders to alter the adjustment, nor did he demur to any, nor make any such observation as you allude to. I set the brakes three quarters of an hour, at least, before the accident, and watched the effect carefully, until I was obliged to leave the machine, for the first time for two hours, to visit the hold and the electrical room, and to ascertain the rate of the ship, as reported to the officer of the deck. Before I had been absent two minutes, the accident occurred. My only reason for troubling you with this is, to correct your impression that I persisted in increasing the strain, when the men under my command hesitated."

THE SOCIETY OF ARTS' EXAMINATIONS.

The first ordinary meeting of the Society of Arts was held on Wednesday, the 18th inst., and the speech which Mr. C. Wentworth Dilke, the newly-elected Chairman of the Council, then made, more than established the correctness of the view which we took in our last number of the recent disputes. After addressing himself to the general business of the Society, the Chairman made a statement in which the whole ground of difference is set forth in a plain and faithful manner; and if any of our readers have a lingering doubt as to the presumptuous and dangerous character of Dr. Booth's proceedings, we recommend them to procure and peruse last week's *Journal of the Society of Arts* (No. 261, for Nov. 20), and their last doubt will certainly vanish. If any one has cause to deprecate still further disclosures, it is Dr. Booth, we fear, rather than any opponent of his.

IMPROVED STEAM BOILER FURNACES.

A new steam engine boiler, patented by Rear-Admiral of the Blue, John Jervis Tucker, and Mr. George Blaxland, chief superintendent engineer at Sheerness Dockyard, has been under trial for some weeks past, the trial being superintended by Mr. John H. Langley, inspector of machinery on board the *Edinburgh*, for the steam squadron of reserve. The advantages the patent boiler possesses are, doing away entirely with the tubes now used in tubular boilers, generating a larger supply of steam with a less quantity of fuel, and not being subject to derangements in heavy weather at sea, like the present boilers. It is reported that the Admiralty have granted permission for one of the large class gunboats at Sheerness to be fitted with a boiler of the same description as the one now under trial, and she is to proceed to sea for a series of days, in company with a gunboat of similar class, having the present tubular boilers fitted, in order fairly to test the effect in a heavy sea way. A description of the improved boiler is at present in our hands, and we shall shortly publish it with illustrations. We will only state, at present, that the improvements are of a very simple character, and that, from a personal inspection of our own, made a few weeks since, we are led to expect the best possible results from them.

SEMPLE'S PATENT PIPE TUBE OR STEM.

Mr. M. Semple, of Plymouth, has patented, and Messrs. Wolf and Baker, of Sambrook-court, Basinghall-street, London, are manufacturing the improved pipe tubes or stems represented in the annexed engraving, which have already come into very general use. Mr. Semple's invention essentially consists in making pipe tubes or stems with a well or reservoir for receiving the essential oil formed in one piece with the tube; and he prefers to manufacture

Fig. 1.

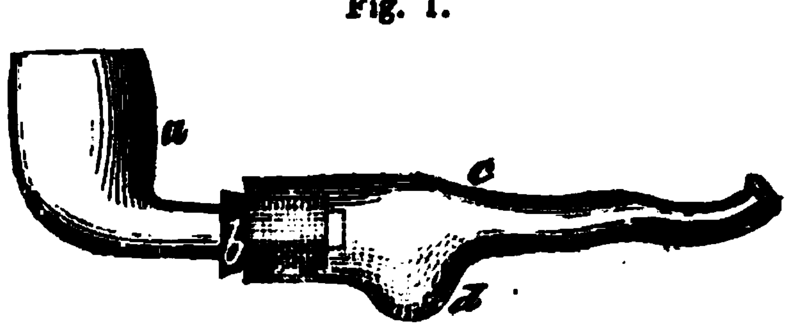
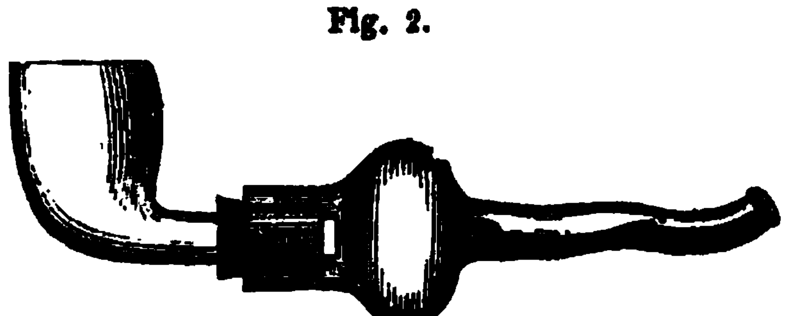


Fig. 2.



such tubes in glass, and to make the mouth-piece flat, in order to suit the lips. These tubes are found very pleasant to the mouth, and can be easily cleaned by washing with water. It will be found useful before fitting the stem of the pipe-bowl in the tube to place a piece of muslin, or other like material, over the stem. The muslin then acts as a filter.

Fig. 1 is a view of a pipe, *a*, fitted by means of a cork, *b*, into the improved stem, *c*, which is furnished with a well or reservoir, *d*. Fig. 2 is a similar arrangement, but having the well or reservoir entirely around the stem, to prevent the oil running out of it as the pipe is handled.

THE DRAINAGE OF LONDON.

To the Editors of the Mechanics' Magazine.

Gentlemen, — Your insertion in No. 1788, of an extract from Mr. Lipscombe's pamphlet, on "The Drainage of London," induces me to offer the following observations, if it is not too late, on the main channels. First: Are they necessary, provided the impurities can be diverted before reaching the river? If not, what is the best means of collecting the sewage? On this point Dr. Hawkesley addressed Sir Benjamin Hall, some time since, suggesting receptacles to every house, for its collection and purification. This did not appear to meet with popular favour, perhaps from a fear of the old cesspool system. Therefore I propose a plan similar in principle to his, only in combination with the proposed system of subways, by placing apparatus such as he described, or other, at the mouths of the several house drains; then collecting the products into properly constructed vehicles, having communications with the subways, and thus forwarding it to the various railway stations *in transitu* to the several depôts in the country, the principal subways having a line of rails with sidings at convenient distances. This scheme would, no doubt, involve a great expense; though, I hope, nothing like the main channel system, which, if constructed, must be enlarged after a few years, unless made of an extraordinary size; besides which, London would be comparatively sweet, not requiring stink-flues for carrying off the effluvia of drains, &c.

Should you think any of the above observations worthy of insertion, you would oblige Your very obedient servant,

Wm. A. Bendelow.

Nov. 19, 1857.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Observing in your last number a notice of a new scheme for the purification of the Thames, and disposal of the sewage proposed to be effected by Mr.

Lipscombe, by hydraulic power, will you permit me to state that the new scheme in question appears to me to be an imitation of a comprehensive plan which, about the middle of 1856, I forwarded to the commissioners appointed to consider the question of the main drainage, and to the commissioners for ascertaining the best means for distributing the sewage, and both of which desiderata I proposed to accomplish by means of pneumatic or atmospheric power. I am, Gentlemen, yours, &c.,

CHARLES MAYBURY ARCHER.

3, St. James's-gardens, Haverstock-hill, Hampstead-road, Nov. 18, 1857.

PATENTABLE INVENTIONS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The decision in the case of Brook and another *v.* Aston is certainly an important one, inasmuch that it will, to a greater or less extent, affect the value, if not the validity of many existing patents. I infer, however, from the summing up of Lord Campbell, that, had an alteration or addition, however slight, been made in the machine in question, a different decision would have resulted. Now, besides many precisely similar cases, there are others which are sufficiently analogous to be affected by this decision, and upon which it would, perhaps, be well that a little light should be thrown. For instance, when the discovery was made that pictures or ornamental designs could be drawn upon or imparted to suitably prepared glass or silver plates by means of the sun's rays, a valid patent could, of course, have been taken out, securing the advantages of the process to the inventor. Supposing, however, that afterwards another person had discovered that he could, by the same means, ornament pottery, or wood, or stone, or some other material in his own particular branch of trade, and not contemplated by the original inventor; could such person obtain a valid patent for the novel application to a useful purpose of the known process? I, of course, assume that the original patent was taken out for "improvements in ornamenting suitably prepared *glass or silver* plates by the agency of the sun's rays;" and not "glass, silver, and other suitable materials."

Or, if we take the case of more tangible matters, as leaves, or other natural objects, a person making the discovery that he could, by taking a cast or electrotype therefrom, employ the same for printing, could obtain a valid patent for the process. Supposing, however, that he only contemplated its applicability to printing upon *paper*, and confined the title and claims of his patent thereto, could another person secure a *valid* patent for the application of the process to printing upon other materials? that is, supposing the application to be useful as well as novel.

I am, Gentlemen, yours, &c.,

WILLIAM GREEN.

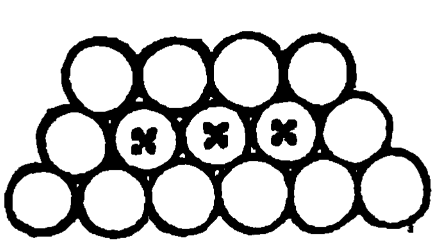
Pembroke Cottages, Caledonian-road, Nov. 23, 1857.

[Both the cases suggested by our correspondent are precisely analogous to that of Brook and another *v.* Aston. If the inventor, by his title, restricts his invention to any particular purpose or purposes, the public have the benefit of the invention for all other purposes, and no patent would hold for its application to any of these. Where a known process or machine requires the slightest addition or change to adapt it to any purpose, and without such addition or change would not answer, then a valid patent could be obtained, as such addition or change would constitute an invention. —EDS. M. M.]

THE ATOMIC ARRANGEMENT OF FLUIDS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Assuming that atoms have an existence, we may, neglecting the imperceptibly small influence of gravity upon such, assume them to be round; for, to consider a body to be of this shape, which we cannot discover to be influenced in a perceptible degree by any external force, is a just, and, upon the grounds of physical science, more than probable assumption. We see an almost perfect illustration of this in our globe, and the various other bodies of the solar system, while it is not less evident in that childish source of pleasure, the soap bubble. It should, however, be remembered that the influence of gravity on the atoms of fluids would be greater than upon solids, on account of their readiness to yield to its force; and as the principle is the same in all, with the exception that the more ready the atoms of a body are to yield, the greater would be the deviation from the spherical condition, we may take water as an example. Now, supposing each atom to be round, it is obvious that a certain space must exist between each, and also that no two can touch in more than one point, and I think that the arrangement must necessarily be the following:—Here



any particle x is in contact with six others, which I think must be the cause; do such at

all exist, although both Dalton and Swedenborg agree in assigning four to be the number.

I think that the easy displacement of all such bodies is to be accounted for on this hypothesis, because, as they touch but in one point, there can be scarcely any friction or cohesive force; and we know that the latter alone keeps the atoms of a body in rigid connection, but the atoms of a fluid are easily separated and as readily unite; and this is the reason why such preserve an even and horizontal surface, the friction being so small that any number of atoms have not sufficient power to support one above them, and so they all sink upon one another for both lateral and downward support. J. A. D.

THE IRON QUESTION.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I thought I had sufficiently eulogised Mr. Bessemer in my letter inserted in your number of the 24th Oct.; but it does not seem to satisfy Mr. William Green. I said that Mr. Bessemer had not yet overcome the difficulty; I did not even hint that he never *would*, or never could overcome it. It was not logic with which I had to deal. I wrote about well established facts; and not one of Mr. Bessemer's published patents has enabled any manufacturer to produce either marketable iron or steel from common materials.

Mr. Bessemer may have a process not yet disclosed for amending the former processes, and by which he may be enabled to produce both marketable iron and steel from ordinary cast-iron; but even if this be so, he has been anticipated by R. Mushet's invention, which has already produced from ordinary pig iron sound welding cast steel and tough iron.

There are some of the purest descriptions of charcoal pig iron which, when treated by Mr. Bessemer's published processes, afford cast steel, which has many of the characteristics of first-rate steel as regards the colour, grain, and facility of tempering; but then it is full of cells in the ingot, it is cold short in the bar, and is not very tough at a red heat, and if heated a little above a red heat it crumbles under the hammer; yet when carefully drawn out it tempers well, and makes excellent cutting tools.

I do not of course attempt to reason upon any forthcoming patents of either Bessemer's or Mushet's, but confine myself strictly to those which are known to the public; and as regards these, it is certain that Bessemer's processes are of little avail without Mushet's amendment; and Mushet's process is not valuable apart from the process of purifying cast iron, by forcing air through it when melted, or apart from some other process for purifying it in any other convenient manner, if there be any other manner of purifying cast iron. Without hammers and rollers the puddling process avails little or nothing, and hammers and rollers would be of small account without puddling furnaces. Possibly the astute Mr. Green may be able to comprehend this logic, though he could not comprehend the parallel case between the Bessemer and the Mushet process. Each appliance and each process possesses its own peculiar degree of excellence and merit; but they are mutually dependent upon each other for utility of operation and for perfecting the results obtained.

Nothing that Mr. Mushet can hereafter invent can in any way entitle him to the merit of Mr. Bessemer's great discovery; and, on the other hand, nothing that Mr. Bessemer may hereafter patent can deprive R. Mushet of the merit of having been the first to remove the obstacles to the success of Mr. Bessemer's process.

As to Mr. Bessemer having the wisdom to foresee that the air would deflagrate and destroy the sulphur, it is mere bosh; for the sulphur remains if you blow the iron down to the last particle; so does the phosphorus. I am, Gentlemen, yours, &c.,

Σίδηρος.

Nov. 16, 1857.

SUBMARINE TELEGRAPH CABLES.

To the Editors of the Mechanics' Magazine.

Gentlemen.—In No. 1787 of the *Mechanics' Magazine* Mr. Cheverton has thought fit to express a doubt as to the validity of the patent which I have drawn, in conjunction with Mr. Blooms, for laying submarine electric cables, on the grounds that his son had proposed to buoy up the cable by means of floats filled with air, and attached at intervals by means of spring clippers. I beg to state that I claim no such invention as mine; but if Mr. Cheverton will consult the patent list he will find that the plan of buoying up the cable by means of air-tight floats was patented by George Shepherd, C.E., several months before any attempt was made to lay the Atlantic cable. When I gave a description of our patent at the Manchester Town-hall, I did not state what substance would be used for buoying up the cable, not through wishing to retain any portion of the invention as a secret, but because I was then engaged in conducting a series of experiments on the various substances named in the specification. The result of those experiments led to the conclusion that the most suitable substance would be rushes, of the kind used by coop-

ers for rendering the joints of casks waterproof. We propose to construct a rope with this material, of a length equal to that of the cable to be submerged, and to fasten it temporarily to the cable by means of tape, winding it in a spiral direction by means of a machine similar to those used for winding silk round cotton cord. The weight of the Atlantic cable is about twenty ounces per yard; and we find that one ounce of rushes is sufficient to cause that length to float on the surface of the water. The weight, therefore, of such a rope required to float 1,000 miles of cable would be only fifty tons, and the cost would be merely nominal. In order that the cable may be freed soon after being payed out, we propose to cut the tape in lengths of about 18 inches, then to fasten them together by means of a compound soluble in water, and which would be regulated in its manufacture so as to dissolve in any given time. The rushes would rise to the surface of the water, and the cable, resuming its original specific gravity, would sink below, but only at a considerable distance from the ship paying it out.

Mr. Cheverton brings an objection against this plan by stating that, if allowed to float, the cable would be exposed to the influence of currents. Granted; the cable would not sink in a perfectly straight line; but as the amount of surface exposed to that influence would be very small, and that only during a very brief period, the deviation from the straight line would be too little to be of any importance. It is also obvious that this objection applies to almost every plan differing from that which has been adopted. Thus Mr. Bodie proposes that the cable should be constructed so light that its specific gravity would be but slightly in excess to that of water, so that it would be three hours in sinking. Mr. Allen's original plan is analogous. Mine differs from that of these gentlemen only in this—that the specific gravity of the cable would be altered temporarily, and that within half an hour after being immersed it would resume its original specific gravity, so that it would reach the bed of the Atlantic in half the time required in Mr. Bodie's plan, and consequently would be less liable to be carried away from the ship's course; for we must not suppose that currents exist only on the surface of the water. But even if it were four hours in sinking, I do not think that the drifting of the cable would cause any serious inconvenience. The worst would be, the loss of a few miles of cable, which, of course, should be obviated as far as possible, but which cannot be altogether prevented. The plan of Mr. Bodie will, doubtless, receive all the attention which it deserves; but it should not be forgotten that one great advantage in a cable covered with wire is, that its weight would cause it eventually to sink into the soil on which it would be laid, after which it could scarcely ever wear out; but if constructed light, it would remain in the water itself, with no other protection than a material by far more perishable than iron wires.

I may here state, that in our specification we propose that the specific gravity of the prepared cable should slightly exceed that of water, so that it would not, on being paid out, float on the surface, but would sink slowly below the waves. I state this fact in answer to a question which has been asked, whether the waves would not injure the cable? This, however, I do not consider of much importance; for every engineer knows that a cable floating loosely on the water will rise and fall with the waves. Father Neptune may be able to destroy the largest ship ever built; but to bite a loose cable in two, is more than he could accomplish even in his angry moods.

In conclusion, I beg to state that it is not without considerable diffidence that I come before the public with a plan for obtaining an object which has occupied the attention of so many engineers; but I cannot accuse myself of intruding a crude idea of a matured invention; for this plan has formed the sole object of my attention during several months; and whatever may be the result of my researches, I believe that your readers will not accuse me of being in the habit of availing myself, in any of my inventions, of ideas which have emanated from the brains of other men.

I am, Gentlemen, yours, &c.,

John de la Haye.

33, New Baily-street, Salford,
Manchester, Nov. 24, 1857.

THE WAVE LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

Gentlemen,—"Nauticus," in No. 1789, is right. The "wave line," as so called, has its objections—objections such as would have brought it to an end long since, had not the mysterious *influence* of words, so profusely used, kept it from sharing the fate of all imaginative benefits in practical science; but time and experience ultimately work a cure for all things.

I was asked, a short time since, at the Admiralty, by its highest practical authority, "*What is not a wave line in shipbuilding?*" he who asked it being more amused with its influence in name than convinced of its advantages as applied to the floating section of a ship, or what is understood as the load immersion line,

Between the years 1809 and 1812 I gave much attention to this immersion line, to get rid of the heaping up of the water, so retarding to speed, and I found more advantage in a straight than in a hollow entrance, such as is denominated the wave line; and the Americans at that date made it a rule to give an unusual rake to the stem in their fast vessels, expressly to get rid of a hollow entrance line.

Some fifteen years subsequent, White, of Cowes, gave the name of "*long-bow*" to his version of the entrance line, and the use of names worked wonders in his favour, as it has since with the author of the "wave-line," to whom I became known when I had no idea of his ever becoming more than an amateur ship-builder; and I regret that time and circumstances will not allow me to enter more into the merits of the subject, and that I am not able at present to enter into the particulars in which way I gave the first naval architectural instructions to Henry Steers, whose son built the noted yacht *America*. A few years since I published some practical results to show that the wave line floating section was an *inverted* section of a body experimented upon by a distinguished theorist of his day, and that the changing of one end for the other in that body reduced instead of increased the speed; but time and experience since have done more to cure the disadvantage of the change than the noted experiments to which I called attention.

NEPTUNE.

UNIVERSAL CURVE DELINEATOR.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I have designed an instrument for drawing curves, and thinking that it would be useful to draughtsmen and others, would, if original, request you to publish this drawing and description of the same.

A is a frame having a number of screws

A

fastened to it, which are in connection with a piece of steel, which may, on application of the screws, be brought to any shape, and thus any curve may be described by a pencil working upon it. I should think that a watch spring would answer very well. The screws might be at regular intervals.

J. A. D.

[An apparatus, constructed upon the same principle as the above, is frequently used by draftsmen on the mould-loft floors of dockyards, for the purpose of transferring the form of ships' timbers from the floors to moulds, and for other similar purposes.—EDS. M.M.]

ROBERTS' PATENT PUMPS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Assuming the correctness of the trials in No. 1787, which I do not doubt, Mr. Roberts has made a marked and valuable improvement on Downton's pumps; but, with other readers, I am not acquainted with them, and therefore seek some approximation to the absolute value of Roberts' pump. This I cannot arrive at without some more particulars of the trial, and hence avail myself of the inventor's readiness to give them, preferring to ask them publicly, because it is a matter of general scientific interest and ability.

Was the length of lead suction of 23 to 24 feet perpendicular from the water to the pump? If so, this must be, I presume, added to the perpendicular lift of 15 to 16 feet, therefore equal to, say (24 + 15) 39 feet. Did the leather suction of 31 feet trail or coil on the ground like the hose of fire engines, or was it perpendicular? How many bends were there, and at what angles? What is the depth, length, and breadth of the tanks filled? Did they run over at the top? How many revolutions were made, and with what number of men? What is the weight of the pumps, stand, and fly-wheel, the breadth of the whole, and the height from bottom to top of fly-wheel? This will give us the room occupied by the pump.

When Mr. Roberts states that "the suction of my pump is 3 feet, the diameter of cylinders 5½ feet, and stroke 6 feet," I presume he means inches.*

I am, Gentlemen, yours, &c.,

ENQUIRER.

Nov. 23, 1857.

* The error was a misprint, and did not exist in the MS. of Mr. Roberts.—EDS. M. M.

STRENGTHENED CAST IRON GUNS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—On the 7th of this month you were kind enough to insert a letter from me in reference to the priority of the discovery and adaptation of a principle to the manufacture of guns, which I may describe thus: The gun should be made of concentric laminæ, so put together that at the moment of firing as much of the metal as possible may be equally strained.

You thought that Mr. Mallet had forestalled me, but it turns out that our discovery was quite independent, and nearly simultaneous. Mr. James Longridge, about the same time, came to the same conclusions, but prefers wire to strengthen the gun. In this I perfectly agree with him, but he must wait some years till Government arrives at that point. Of course, the guns mentioned by your correspondent "Observer" last week are on this principle, but will be more expensive, and not nearly so strong as if strengthened with either wire or wrought iron cylinders. "Observer" is wrong in attributing to the Chairman of the Select Committee any wish to appropriate this invention. There is no secrecy about the experiment, and if it is successful it will be time to decide who proposed it, or discovered the principle. Meanwhile, we should bear in mind that the Select Committee have such numbers of suggestions—in 1855, upwards of 6,000 inventions were *considered* by them—that they *must* get ideas, without themselves remembering from whom or when.

The system of employing, to investigate new proposals, officers who have already more to do in their own departments than they can fully manage, is wrong, but will never be remedied so long as a war minister has to please the taxpayers. As one of the consequences of this system, I may mention that the average consideration each invention received in 1855 was *two minutes*, and that *all six thousand were rejected.*

I am, Gentlemen, yours, &c.,

T. A. BLAKELY.

THE PROPULSION OF THE "LEVIATHAN."

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I am compelled to publish this announcement, the Press refusing me justice. I ask, Who invented the use of the screw propeller and paddle wheels combined in the same vessel? Now I first proposed and published it to the Admiralty and the Peninsular and Oriental Company in 1844. I published it in a pamphlet the 11th March, 1850, in the *Magazine of Science* in May, 1850. I sent copies of my pamphlet to engineers (Scott Russell and Brunel included). I had a copy given by M.D. Wyatt, Esq., the secretary, to every one of the jurors, Machinery Section, Class 5, of the Great Exhibition, 1851, Scott Russell and Brunel being among that jury. These men have coolly appropriated my invention, without one word of acknowledgment. Mr. Scott Russell pretends to have published a statement in which all concerned in the original design of the *Leviathan* have received their due share of merit. Has he mentioned my name? No. Is this fair? Is this honourable?

I am, Gentlemen, yours, &c.,

GEORGE OVEREND.

Guernsey, Nov. 19, 1857.

[We think Mr. Overend's claims and allegations very weak indeed, for the mere use of the well-known paddle-wheel and the well-known screw in the same ship is no invention whatever, and is no more his method than ours, or any other person's.—EDS. M. M.]

ROAD-MAKING.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—There has been a little discussion on the above subject lately as to the advisability of using rollers on newly Macadamized roads. I do not pretend to enter into the scientific part of the question, but merely to observe that, if practicable, Messrs. Blackburns' roller, provided with sleepers on Mr. Boydell's principle, would appear to meet the difficulty of expense.

I am, Gentlemen, yours, &c.,

WM. A. BENDELOW.

14, Great Castle-street, Regent-street, W., Nov. 19, 1857.

[There can be no doubt that steam power might be readily applied to the rolling of roads, or that the engine of Messrs. Blackburn might be used for the purpose; we do not, however, understand with what view our correspondent proposes to apply Boydell's rails to that engine. The cylinder of Blackburn's arrangement overcomes the evils which Boydell's rails are intended to get rid of.—EDS. M. M.]

THE MECHANICAL PHENOMENON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Allow me to explain the "Mechanical Phenomenon," alluded to by Thomas Crosfield in your last number.

The apparent motion of the two wheels was the excess of speed that the upright wheel was going over them. The same apparent motion is frequently observed while sitting in a train in motion, in a second train, also in motion, but going slower than

ourselves. If the two wheels, or the second train, were respectively going faster than the upright wheel or the first train, the motion would appear as before, in point of speed; but the direction of motion would appear as the real direction of motion.

I am, Gentlemen, yours, &c.,

EDWARD J. POWELL.

Admiralty, Nov. 23, 1857.

MISCELLANEOUS INTELLIGENCE.

CLAYTON'S BRICKMAKING MACHINES.—Mr. Henry Clayton (of the Atlas Works, London) has just completed twelve of his patent brick machines for works of the Government at Ceylon. These simple and effective machines appear to be coming daily into more universal use. A few weeks since several of them were lying at the docks to be used in railway construction at Paraguya, South America.

BRITISH INGENUITY.—English statesmen understand much better than our own the value of the inventor and the engineer to the progress of the arms, commerce, and manufactures of a nation. A glance at the record of patents granted by the British Government, during the past year, affords a convenient opportunity for estimating the drift of an inventive genius in Great Britain. While there are 68 patents for fire-arms, 41 for improvements in gun carriages, and 11 for gunpowder and other explosive compounds, there are no less than 73 for steam engines, 52 for boilers for steam engines, 71 for improvements in the construction of railroads and locomotives, 53 for marine engines, and 77 for arrangements for consuming or preventing smoke in all descriptions of furnaces. The inventions and improvements relative to textile manufactures were exceedingly numerous, as also those of looms, and machinery for producing them. For soaps there were 21 patents, 33 for land and water conveyance, and 34 for pipes, tiles, and bricks, 36 for writing instruments, 38 for paper and pasteboard, 46 for lithography, and 54 for novel arrangements of motive power, or power to be obtained from new sources. In the manufacture of iron, 120 patents were taken out. —*Scientific American.*

SPECIFICATIONS OF PATENTS RECENTLY FILED.

GREAVES, H. *Improvements in the mode of coupling or connecting pipes, columns, and conduits, in the machinery for manufacturing the hoops to be used in connecting such pipes and columns, and in the shape of such pipes, columns, and conduits, whereby they become adapted for the support and conveyance of vehicles.* Dated Mar. 5, 1857. (No. 645.)

This invention relates to a method of joining pipes for the conveyance of gas, water, or other fluids. Also to the employment of such pipes combined with a cast-iron rail or tramway, for the double purpose of conveying fluid or other bodies, and as bearing surfaces for vehicles. Likewise, to the forming of solid or hollow columns, and to the method of manufacturing the hoops used for connecting the ends of such pipes, conduits, or columns.

WOODLEY, J., and H. H. SWINFORD, *Improvements in sawing machines.* Dated Mar. 5, 1857. (No. 648.)

This invention cannot be properly described without engravings.

BOWER, G. *Improvements in apparatus for manufacturing gas.* Dated Mar. 5, 1857. (No. 649.)

This consists of a retort placed inside a case lined with fire brick, such retort being furnished with an Archimedean screw for the facility of supplying it with fresh material, the screw discharging the coke or other carbonized substances which have been exhausted of their gas. Other arrangements are included.

THOMPSON, T. J. *Improvements in the construction of gasometers, whereby they are rendered applicable to lighting railway carriages.* Dated Mar. 5, 1857. (No. 650.)

This chiefly consists in certain modes of construction which enable the patentee to dispense with the ordinary mass and weight of water used in gasometers of the ordinary construction, as by this invention no more water is required than is sufficient to form an hydraulic packing of about one inch in breadth, so as to prevent all escape of gas during the working of the gasometer.

NEWTON, W. E. *An improved manufacture of tracing cloth.* (A communication.) Dated Mar. 5, 1857. (No. 652.)

Spirits of turpentine or camphine, castor oil, Canada balsam, and balsam copaiba, in certain proportions, are well mixed, applied to the tracing muslin by means of a sponge, or otherwise, and, when perfectly dried, it is fit for use.

CHEETHAM, J. K., and T. SOUTHWORTH. *Improvements in the use or application of certain substances for sizeing or finishing yarn or thread; also applicable for sizeing or stiffening woven and other fabrics.* Dated Mar. 5, 1857. (No. 653.)

This consists in the use of xylorine or pyroxyline, dissolved by menstrua, to form a solution through which the fabrics are passed.

BOUSFIELD, G. T. *Improvements in machinery for compressing clay and other materials, applicable to the manufacture of bricks and other articles.* (A communication.) Dated Mar. 5, 1857. (No. 654.)

One or more moulds are attached to a mould-carrier, which is moved up and

down between guides by an eccentric on the main axis of the machine. The moulds are bottomless, and into them fit plungers which receive motion from cams placed on the same axis as the eccentric; and there are also other plungers attached to the top framing of the machine which enter the moulds when they are moved up by the eccentric.

COWARD, R. A. *Improvements in screw or submerged propellers.* (A communication.) Dated Mar. 5, 1857. (No. 655.)

The greatest amount of effective propelling surface is brought as near as it can be got to the axis, the object being to take advantage of the tendency which screws possess of drawing the water from the circumference towards the centre, and forcing it back in the form of a cone expanding as it recedes.

CALVERT, F. A. *Improvements in machinery for ginning cotton, and for cleaning and carding cotton and other fibrous materials.* Dated Mar. 6, 1857. (No. 657.)

This relates—1. To ginning cotton, and consists in the combination of an oscillating comb or toothed roller, with a stationary comb and box for containing the seed cotton. 2. To cleaning fibrous materials, and consists in the application of a dirt roller working in combination with a comb drum, and in the application of one or more stationary serrated guards acting in combination with a fine wire cylinder. 3. In applying a grid and receptacle for collecting impurities. 4. In the application of combs to the picker in or breaker and main cylinder of carding engines, working in combination with worker and stripper rollers.

BARTON, L., and E. S. BROOKES. *Improvements in the manufacture of knitted fabrics.* Dated Mar. 6, 1857. (No. 659.)

This consists in the application of parts having rotary action to the ordinary stocking frame, for the purpose of expeditiously making narrowings, or fashioned stockings, shirts, drawers, and other articles.

PETRIE, W. *Improved means of, and apparatuses for creating or increasing draughts and currents.* Dated Mar. 6, 1857. (No. 661.)

This invention cannot well be described without engravings, but will probably be published as an article hereafter.

ORDISH, R. M. *Improvements in suspension bridges.* Dated Mar. 7, 1857. (No. 663.)

The patentee constructs rigid suspension bridges by supporting each at a series of points by inclined straight chains or ties from one or both piers, which chains or ties are sustained in a straight position by means of rods or struts connected or not to the platform, and to curved chains also hung from the piers. These points are thus rigidly supported by the straight chains or ties, and they carry the platform, which is made sufficiently strong to support itself and the load between the aforesaid points.

PARKES, J. *An improved apparatus for locomotive purposes.* Dated Mar. 7, 1857. (No. 665.)

This consists in an apparatus which acts as a substitute for an ordinary wheel where a great burden has to be supported upon soft ground. There are a number of feet, or pattens, each having two axes, one on each side. These axes are supported in bearings, which are all at a corresponding distance from a common centre round which they work, and at the same distance from each other. When the vehicle is set in motion, each foot comes to the ground, and rises therefrom in a position parallel to the surface of the ground, which it retains throughout its passage round the main axle.

HAWKSLEY, G. *An improvement in constructing apparatus for heating and cooling air, steam, and other fluids.* Dated Mar. 7, 1857. (No. 666.)

This refers to apparatus for heating and cooling air, steam, or other fluids, when such apparatus consists each of a series of tubes combined together, within or around which the fluid circulates, and it consists in combining together such tubes into a series, by casting on to them at or near each of their ends a plate of metal.

LUNGLEY, C. *An improved mode of constructing dry docks and basins for the stowage of ships.* Dated Mar. 7, 1857. (No. 667.)

For a full description see p. 507 of this Number.

BROOMAN, R. A. *An improved method of, and apparatus for, maintaining the water level in boilers.* (A communication.) Dated Mar. 7, 1857. (No. 672.)

This consists in connecting to boilers a tube fixed outside of the boiler on a level with the water level required in the boiler, which tube, as long as the water in the boiler does not sink below the regulator level, remains filled with water, but on the water sinking it becomes full of steam, and expanding under the increase of temperature, opens communication with a liquid supply, from whence water rushes into the boiler until the regulator level has been obtained, when the tube, becoming also full of water, contracts, and shuts off further supply.

SHARP, C. *A new or improved manufacture of ships' thimbles, and other metallic fittings, used for rigging and sails and rope gearing in general.* Dated Mar. 9, 1857. (No. 675.)

The patentee claims—1. The manufacture of ships' thimbles and other metallic

fittings for rigging and sails and rope gearing in general, by cutting off short hollow cylinders from iron tubes, and expanding their upper and lower ends by dies and pressure. 2. The manufacture of heart-shaped thimbles, by dividing a circular thimble at one side, and fashioning the divided ends by forging, or by pressing an undivided circular thimble by means of pressing tools.

HEMMING, F. S. *Improvements in the manufacture of railway chairs and sleepers.* Dated Mar. 9, 1857. (No. 677.)

The substances here employed are animal or spent vegetable fibrous materials, such as spent tan, spent hops, paper, hair, rope, &c. These substances are reduced to a dough, mixed with oil, tar, &c., and are then put into moulds and subjected to pressure.

DAVIES, G. *An improved self-inking stamp for printing cards, labels, and other articles.* (A communication.) Dated Mar. 9, 1857. (No. 679.)

The frame and bed of the apparatus are of cast iron, and support the stamp by means of a crank below and an arm or link above. The stamp is provided at its lower end with a die, upon the under surface of which is formed the design to be printed. The upper end of the stamp is provided with a hand piece, by striking which twice with the open hand, the die is inked and the impression given. Automatic contrivances are adopted for inking the stamp, &c. This stamp may be arranged so as to be operated by the foot by means of a treadle.

CUMINE, J. A., and C. HUNTER. *Improvements in electro-magnetic engines and batteries.* Dated Mar. 9, 1857. (No. 680.)

Under one form the engine consists of a revolving ring of armatures and a stationary ring of magnets, one ring inside the other, and working just clear of contact. The shaft carries the make and break contact apparatus, and is so arranged that the battery power is cut off and let on between the successive magnets and armatures as each successive armature passes over the allotted distance of its action. Every magnet operates attractively upon several armatures at once, so as to exert a very powerful attractive force in causing the armature wheel to revolve, and thus give out or develope a useful motive power. The battery comprehends a peculiar arrangement or combination of steel plates, capable of application for general purposes; provision is made for reversing the action of the wheel by reversing the current.

FAULKNER, S. *Certain improvements in machinery or apparatus for carding cotton and other fibrous substances.* Dated Mar. 9, 1857. (No. 681.)

This relates to a patent previously granted to the patentee, dated July 25th, 1843, and consists in the addition of an extra carding cylinder, termed a finishing cylinder, which receives the carding from the main cylinder by means of an additional smaller, intermediate, or fancy cylinder. This latter cylinder is placed in the position usually occupied by the doffer cylinder and the doffer roller, which strips the finished carding from the finishing cylinders, and is situated nearer the front of the machine.

COOK, E., and J. STOKES. *Improvements in certain parts of metallic bedsteads.* Dated Mar. 9, 1857. (No. 682.)

This consists in making the laths of sufficient length to rest on the sides or frame of the bedstead, and in rivetting the ends of the laths to the frame. The laths are cut, and the rivets made by machinery to insure uniformity of size.

SMITH, H. R. *Certain improvements in manufacturing and purifying gas made from coal or other bituminous substances for illumination.* Dated Mar. 9, 1857. (No. 683.)

This consists in the use of a conical-shaped vertical retort, which causes a more uniform distribution of heat. Also in purifying gas by a combination of the hydraulic condenser with the lime purifier.

SIMPSON, F. *An improved mode of forming a screw in the necks of bottles, jars, and other similar vessels.* Dated Mar. 9, 1857. (No. 684.)

This consists of a flexible spring bent into a bowed form at the upper part. To the ends of the jaws are rivetted two pieces of metal shaped to the neck of the bottle, &c. In the centre of the spring-clip is fitted a rod, the lower end of which passes between the jaws of the clip. This end is made conical, and a screw-thread formed thereon. The upper end passes through the bowed part of the spring-clip, and terminates in a cross handle. The upper part of the rod is retained in its place by a nut, and the lower by a transverse rod. The melted glass to form the neck is placed on the central rod, and the jaws of the clip are brought together to form the exterior of the neck, and press the glass into the thread of the screw. When the glass has hardened, the metal screw is turned by the cross handle, and the bottle, &c., withdrawn, leaving a moulded screw formed inside the neck.

DENNETT, C. C. *A new construction of floors and ceilings of buildings.* Dated Mar. 9, 1857. (No. 685.)

This consists of fire-proof arches composed of the sulphate of lime and an artificial Pouzzolana, of burnt clay or porous cinders, further strengthened with lamma of wood or iron, which arches form both floor and ceiling in one substance.

LIEBMANN, C. H. J. W. M. *Improve-*

ments in the purification of water and the preparation of materials requisite for the process. (A communication.) Dated Mar. 9, 1857. (No. 686.)

Before the proper application of this system, water containing carburetted and sulphuretted hydrogen must be freed from the same. It consists, 2ndly, in impregnating the water with carbonic acid to one-tenth of its volume. After the impregnation with carbonic acid, hydrate of lime is added to the water without regard to form, as either powder, cream, or lime water. The lime having been precipitated by carbonic acid, the water settles and clears itself.

NEWTON, W. E. *Improved machinery for cutting screw-threads.* (A communication.) Dated Mar. 9, 1857. (No. 687.)

This invention cannot be described without engravings.

NEWTON, W. E. *Certain improvements in steering apparatus for ships and other vessels.* (A communication.) Dated Mar. 9, 1857. (No. 688.)

This relates to steering apparatus in which the horizontal shaft of the steering wheel works in bearings supported upon the rudder head, or upon a tiller attached thereto, and imparts motion to the rudder through an upright shaft which is carried by the tiller at a distance from the rudder-head, and which gears by toothed gearing with the steering wheel shaft, and carries a pinion gearing with a toothed arc. The invention cannot be described without engravings.

NEWTON, A. V. *An improved construction of rudder.* (A communication.) Dated Mar. 9, 1857. (No. 689.)

This consists in providing the rudder with a moveable balancing extension piece, so hung that it may be swung down so as to extend forward under the keel of the vessel and in advance of the pintels of the rudder, so as to present a rudder surface, both forward and back, to the axis upon which the rudder turns. It may be swung up on approaching shoal water.

MARSHALL, J. G. *Improvements in machinery for preparing flax, hemp, China grass, and other fibrous substances.* Dated Mar. 9, 1857. (No. 690.)

This consists in the use of rollers having a reciprocating rotary motion working alternately backwards and forwards in opposite directions. This motion is so arranged as to produce on the whole a progressive motion, whereby the material will be passed through the machine.

KNOX, A., and T. ROBSON. *An improved gas regulator.* Dated Mar. 9, 1857. (No. 691.)

This invention was described and illustrated at page 289 of No. 1781 of the *Mechanics' Magazine.*

BARLOW, W. H., and J. SAMUEL. *Improvements in cast iron sleepers for railways.* Dated Mar. 9, 1857. (No. 692.)

These sleepers are to be laid longitudinally. Each sleeper is by preference of a rectangular form. The upper surface has a central longitudinal trough divided at intervals transversely by partitions. The several recesses are suitable for receiving wood. On either side of the walls, constituting the longitudinal trough, there are at intervals inclined buttresses which are cast hollow on their under sides, producing great strength with comparative lightness. The rails are fixed by means of chairs which are cast to correspond with the upper surface of the sleepers, and with these chairs filings of wood are combined. Modifications are included.

FITTON, F. A. *Improvements in certain machines for preparing, spinning, and doubling cotton and other fibrous substances.* Dated Mar. 9, 1857. (No. 694.)

This consists—1. In placing the roller which guides the bands used to impart motion to the spindles at an angle with the roller or drum which drives the bands. 2. In driving loose revolving bushes, when used in slubbing and roving frames, by means of a bobbin wheel or board. 3. In attaching the oil cup and bush used to form a top bearing for the spindle in roving and slubbing frames to the flyer.

DUYCK, J. E. *An improvement in treating cotton seed, in order to extract colour from the oil obtained therefrom.* Dated Mar. 9, 1857. (No. 695.)

This consists in treating cotton seed with an alkali, in order to obtain the oil therefrom, which treatment extracts the colour from the oil, or fixes the colour in the other products resulting from the pressure.

NEUENSCHWANDER, J. *Improvements in the process of preserving milk.* Dated Mar. 10, 1857. (No. 697.)

This consists in putting the milk, whilst quite new, into a vessel, in which it is parboiled, and milk mixed with horseradish added to it. Also in bottling the milk and boiling the bottles for an hour.

DAY, W. C. *Improvements in portmanteaus.* Dated Mar. 10, 1857. (No. 698.)

The patentee constructs portmanteaus with a narrow rigid framework of metal for the top and bottom, which framework forms the only rigid part, the rest of the portmanteau collapsing at pleasure.

REYNAUD, C. *Improvements in the application of India rubber springs to mattresses, sofas, chairs, and other cushions or articles of furniture.* (Partly a communication.) Dated Mar. 10, 1857. (No. 699.)

The patentee supports the India rubber springs on wood rails, over which they are

looped at suitable intervals. These springs depend from the rail, and carry a light metal frame, which rises up on each side of the wood supporting bar, leaving perforations by which it is attached to the cross girths or webbings forming the upper part of the mattress.

HAMILTON, J. *Improvements in coating iron and other metals with metallic substances.* Dated Mar. 10, 1857. (No. 700.)

The patentee claims—1. The coating of iron, &c., with lead previously coated with tin or zinc, or compounds thereof. 2. Coating iron, &c., with compounds in which lead is two-thirds of the whole, or in greater quantity. 3. Coating iron, &c., with china or tea lead.

BAYLIS, C. *An improved method of constructing and arranging roads and ways particularly applicable to populous cities and crowded thoroughfares.* Dated Mar. 10, 1857. (No. 701.)

The patentee combines a tramway with roads for ordinary carriages and foot passengers, so that the traffic on both can be carried on without interfering with each other. Provision is made for the sewers, also for the gas and water pipes and telegraph wires by excavating the ground, and building three tunnels side by side and parallel to each other. In the centre one he places the main sewer, and in the others the gas and water pipes and the telegraph wires.

JONES, R. L. *Improvements in regulating clocks by electricity.* Dated Mar. 11, 1857. (No. 702.)

The patentee regulates one or more clocks from one standard clock in the following manner:—The standard clock makes the connection for an electric circuit at each beat of the pendulum. The electric current acts upon the pendulum of each subsidiary clock, so as to control its slight tendency to move faster or slower than the pendulum of the standard clock.

MOUNTFORD, G. *Improvements in machinery or apparatus for cutting or chopping loaf-sugar, roots, and other substances.* Dated Mar. 11, 1857. (No. 703.)

This consists of a semicircular trough, in which the sugar loaf is placed, and propelled towards one end thereof by means of a piston, in connection with studs which run in grooves in the sides of the trough, with traverse chains and four chain pulleys and ratchet wheel, the last of which is put in motion by a connecting rod with a lever and weight fixed on two uprights. Other details are also included.

MAKIN, W. *Improvements in furnaces and apparatus for generating steam.* Dated Mar. 11, 1857. (No. 704.)

This consists in placing near the back of each flue of boilers, having two inside flues or tubes, an additional hollow boiler plate bridge, under which the heat and flame pass from the bridge placed in the ordinary position at the back of the fire bars.

DERRIEY, J. J. *Improvements in machines for manufacturing lozenges, wafers, or pastilles of pasty materials.* Dated Mar. 12, 1857. (No. 711.)

This invention cannot be described without engravings.

TRAVIS, G. *Improvements in apparatus used in the manufacture of cheese.* Dated Mar. 12, 1857. (No. 715.)

This is a method of compressing curd, and consists mainly in so arranging pressing apparatus that the pressure shall be constantly maintained on the curd, notwithstanding the contraction of its mass from the expulsion of whey. To allow the whey to escape from the pan, a hole is made in the bottom of its side, and stopped by a plug; when the whey is ready to be drawn off, a strainer is slipped into the pan, and the plug is withdrawn. The strainer reaches from top to bottom of the pan, and has a flat back, which rests against the side thereof. Its front is semi-circular, and of perforated metal, through which the whey passes to the interior, and thence escapes by a hole in the back, which corresponds with the hole in the side of the pan. For cutting the curd a frame has strips of tin plate, which act as knives fixed in it, and also other strips at right angles to the first set, and is worked up and down in the pan by hand, and cuts the curd in squares.

SHAW, J., and W. MANWARING. *Improvements in machinery or apparatus for cutting or reducing turnips or other vegetable substances.* Dated Mar. 12, 1857. (No. 716.)

This consists in applying concentric plates to the circumferences of the cylinders, by which means the space between the body of the cutter and the edge of the knife is diminished, so that thinner pieces can be cut than when such plates are not attached. By removing the surface of such plates further from, or bringing it nearer to the centre of the cylinder, the cut will be thicker or thinner, and this may be done by screws or other means.

NEWTON, W. E. *Improved machinery for drawing and preparing silk, cotton, wool, flax, hemp, and other fibrous substances.* (A communication.) Dated Mar. 12, 1857. (No. 717.)

The object here is to work up and prepare for combing and spinning the short or waste fibres of the above substances, and it is effected by cylindrical combs provided with teeth. The rough fibres are placed upon an endless travelling cloth, which conveys

them to a pair of drawing rollers, around one of which passes an endless band or apron, which also partially covers the comb cylinders, being kept in contact therewith by guide rollers. The fibres are by the drawing rollers and their endless band pressed on to the teeth of the comb cylinders, and partially drawn out and straightened thereby. The fibres are removed from the comb cylinders by taking-off rollers, which conduct them between another roller and endless apron, and thence to another set of rollers, and ultimately out of the machine in the form of a sliver.

NEWTON, W. E. *Improvements in the process of and apparatus for tanning.* (A communication.) Dated Mar. 12, 1857. (No. 718.)

This relates to accelerating the process of tanning, also to apparatus to be used in such process, and refers to a patent of the patentee dated the 29th of Dec., 1855. It consists in conducting the tanning operation in tanks from which air is excluded, and to which vessels motion may be communicated so as to admit the hides to friction, which will create heat and facilitate the tanning process. The patentee does not use naked iron in such parts as would bring the metal into contact with the tanning liquor, but constructs the vessels internally of wood, prepared in such a manner with gutta percha or caoutchouc as to prevent air from passing through the pores of the wood.

HORNE, T., jun. *A new or improved method of ornamenting metallic bedsteads and wash-hand stands.* Dated Mar. 13, 1857. (No. 719.)

This consists in ornamenting metallic bedsteads and wash-hand stands by fusing enamel on the same.

BERGER, E., and J. E. MATILE. *Improvements in machinery for beating and brushing carpets.* Dated Mar. 13, 1857. (No. 720.)

Beating rods are arranged in a machine for the above purpose. The number of beating rods can be increased at will, and a horse or gin can be used as a motive power.

TAYLOR, S. L., and T. E. ROLFE. *Improvements in boilers for generating steam, heating water, and for other heating or boiling purposes.* Dated Mar. 13, 1857. (No. 721.)

This relates to extending the heating surface of Cornish or flue boilers, and consists in placing a water chamber within the capacity of the flue. This chamber has channels of communication at the back end, and with the water and steam spaces of the main boiler to permit the circulation of water and the escape of steam from the auxiliary boiler into the main boiler. It also relates to the furnaces or fire-places, and consists in making the furnace bar frame hollow. Another part relates to coppers, kettles, &c. These they make with a concavity in the bottom, the convex side rising some distance within the vessel. They stretch a tube across this concavity, through which tube the fluid to be boiled circulates. At the top of the concavity they form a passage through to the outside of the vessel, which permits a circulation of the heat and products of combustion around the tube, and allows an escape of those products from the upper part of the cavity.

NEVINS, W. R., and J. J. YATES. *Improvements in preparing and baking bread and biscuits, and in machinery employed therein.* Dated Mar. 13, 1857. (No. 722.)

This consists—1. In an arrangement of machinery for rolling dough previously kneaded, passing it under cutters, and working the cutters which give the desired shape to the bread or biscuit. 2. In suspending from a shaft in ovens (which it is preferred to heat by fire applied at the bottom outside of the oven, and to have flues carried round the sides, ends, and top) swinging pans or trays which, on the shaft being caused to rotate, will carry round the trays, and which, from their connections with the shaft, will always maintain a horizontal position. The inventors find it convenient to feed the trays through a door at the lower part, and to take the bread or biscuits when baked through another door at the upper part of the oven.

WHEATMAN, J., and J. SMITH. *Improvements in the mode of grinding circular saws.* Dated Mar. 14, 1857. (No. 727.)

This consists in substituting for the grinding body at present in use a common sand or grinding stone, in which the periphery of the grinding body acts directly upon the saw secured to a table or bed plate.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

DANRÉ, G., P. F. V. MOUILLARD, and P. A. MERCIER. *Improvements in carbonizing or distilling wood, peat, oil cake, coal, and other substances for the production of gas for lighting, in carburetting or increasing the illuminating effect of, and in compressing gas; also in the apparatuses employed for such purposes.* Dated Mar. 6, 1857. (No. 660.)

This consists—1. In a process and apparatus for carbonizing and distilling coal peat, oil cake, wood, residua of paper, and olives and other substances from which lighting gas can be produced. 2. In a process and apparatus for carburetting or enriching non-carburetted hydrogenous gas. 3. In a method of, and apparatus for, compressing gas for lighting purposes.

BROOMAN, R. A. *Improvements in furnaces and fire-places.* (A communication.) Dated Mar. 6, 1857. (No. 662.)

This consists in constructing furnaces and fire-places with an inclined grate or fire bars, made to move backward and forward, and with a hopper or feed mouth, the bottom of which is formed with a sliding plate, and which projects into the body of the furnace above the end of the grate, at the further end of which is a small plate connected by a cranked rod to the front end, so that when the fire bars are moved to and fro this plate may rise and fall.

PAGNERRE, E. A. *A machine for counting, cutting, and inserting wire in blocks of wood for the purpose of printing and stamping on linen, calico, silk, cloth, and paper, and for all printing purposes.* Dated Mar. 7, 1857. (No. 664.)

Under a table is a foot pedal, which communicates with the upper part of the machine by a lever, which is placed above a reel upon which wire is rolled, and then the wire, by means of pliers and six springs, two of which are placed horizontally, two perpendicularly, and two in an incline plane, compels the wire to enter into a tube which traverses the whole of the machine to the bottom, and there the wire is forced into the block which the workman weaves according to the design; then, by the movement of the pedal and action of the two inclined springs, the wires are cut by a pair of flat scissors according to the height of the block.

URQUHART, W. *A new mode of ornamenting household furniture.* Dated Mar. 7, 1857. (No. 668.)

The design is cut or stamped out of printed paper, and is made to adhere to the surface of the article, and is then varnished down more than once. The effect produced is that of hand painting.

TABOURIN, G. A. *An improved rotative engine.* Dated Mar. 7, 1857. (No. 669.)

The rotative engine of this invention runs in a closed circular chamber, under the constant pressure of some elastic fluid which does not escape after its action.

MARTON, R. J. *Improvements in the construction of steam locomotive engines.* Dated Mar. 7, 1857. (No. 670.)

This mainly consists in effecting rotary motion of the main driving wheels of steam locomotives by constructing an eccentric connecting driving shaft and small solid axle arm eccentrics, to work in concert with the usual old parts of locomotives.

McGRADE, P. *Improved machinery or apparatus for propelling ships or boats.* Dated Mar. 7, 1857. (No. 671.)

The object here is the escaping and obviating the effect of the back water, by means of a triangular wheel, with perpendicular paddles remaining at right angles with the surface of the water, and forcing it in a direct line with the course of the vessel.

No. 673. Provisional protection was not granted for this invention.

LEE, J. D., and J. CRABTREE. *Improvements in power looms.* Dated Mar. 9, 1857. (No. 676.)

This refers to weaving woollen, worsted, and other fibres, by means of a slide plate guard and a regulating screw attached to the picking lever, by which means a lighter or stronger pick is obtained without altering the tappet nose.

TYTHERLEIGH, W. *Improvements in the manufacture of bullets and shot.* Dated Mar. 9, 1857. (No. 678.)

The inventor forms bullets of cast iron by casting as usual, and if the iron employed can be annealed he anneals the bullets by heating them in contact with oxide of iron. He perfects their form by dies and pressure. When he uses wrought iron he forms the bullets by dies and pressure, the iron being in a cold state.

SCHAEFFER, W. C. T. *Improvements in treating the waste waters of woollen and other mills.* Dated Mar. 9, 1857. (No. 693.)

Here an acid with ammoniacal liquor is mixed with the waste wash waters. The mixture is boiled in metal pans by the heat of steam; a quantity of vitriol is then added, and streams of atmospheric air, in a heated state, are passed into the mixture.

GIAJOLA, C. E. *Improvements in moderator lamps.* Dated Mar. 11, 1857. (No. 705.)

This consists partly in the application of the moderator system of lamps to candelabra, lustres, &c., where a number of lights may be fed by oil or other illuminating substance from one reservoir, operated upon by one spring and one piston. It also relates to the patent, No. 109, dated 16th Jan., 1855.

DENHAM, S. *A self-acting machine for the delivery of postage and receipt stamps.* Dated Mar. 11, 1857. (No. 706.)

This relates to a self-acting machine which, on dropping a penny into an aperture formed therein, will give sufficient motive power to the machine to advance and cut off a stamp ready for use.

BODEN, W. *Improved apparatus for flushing water-closets and urinals.* Dated Mar. 11, 1857. (No. 707.)

The inventor mounts in a case a tumbling bucket into which water from a cistern runs. From the bottom of the box containing the bucket depends a pipe, to guide the water to the pan. When water has accumulated to the required extent in the bucket it will lose its balance, and discharge its contents into

the surrounding case, when the water will run down the pendent pipe and flow into the pan below.

HUMPHREYS, J. R. R. *Improvements in apparatus for burning gas.* Dated Mar. 11, 1857. (No. 728.)

This relates to apparatus for effecting more perfect combustion of gas, and to obviate the liability to ignition below that part of the apparatus assigned to combustion. It is applicable for illuminating, heating, cooking, the glazing of yarns, the singeing of cotton fabrics, &c. There are various details in connection herewith.

HALE, W. *An improvement in rolling iron and steel.* Dated Mar. 11, 1857. (No. 709.)

This consists in causing iron when being rolled to be twisted in its grain. For this purpose a pair of grooved rollers, in addition to their rotation on their own axis, are also caused to revolve about the axis of the iron, so as to twist the grain thereof.

COOPER, J. D. *Improvements in producing engraved surfaces for surface printing.* Dated Mar. 11, 1857. (No. 710.)

The design to be produced is drawn on wood, as for ordinary wood engraving; but in place of cutting away the white parts, the lines are cut away, to leave the whites in relief. The block is then repeatedly coated with varnish, until a thick coat is obtained; afterwards, the parts where the whites are broad are built up with cement. The next process consists in taking an electrotype from the block thus prepared, which electrotype is to be used as the printing surface.

WARESQUIEL, A. DE, and J. D'HELLE. *Improvements in railway carriages.* Dated Mar. 12, 1857. (No. 712.)

The object here is—1. An arrangement of carriages permitting their loading and unloading without the aid of turntables; and consists in making the body of the carriage independent of the truck, by establishing between the upper part of this latter and the underside of the body a sort of small turntable, so that the body of the carriage may move in a horizontal direction over an annular plate, and round a spindle fixed on the upper part of the truck, a number of friction wheels serving for guiding the rotative motion of the body of the carriage, and bearing the weight of the same. 2. Each wheel is furnished with an axle, the length being sufficient for allowing the same to turn at both ends in suitable bearings.

AVERY, J. *An improved method of purifying schistous or bituminous oils.* (A communication.) Dated Mar. 12, 1857. (No. 713.)

This consists in submitting the crude or ordinary oils of this class to the action of chloride of sodium, thereby depositing the impurities of the oil. The dregs are drawn off by a tap near the bottom.

AVERY, J. *An improved method of preserving butter.* (A communication.) Dated Mar. 12, 1857. (No. 714.)

The butter is first washed to extract all the milk; it is then spread out, and brandy or alcohol poured over it, then kneaded, after which it is made into balls and wrapped in paper steeped in brandy or alcohol, then in a second paper, so as to exclude the air.

SQUIRES, W. W. *Improvements in the means of letting on and drawing off water and other fluids.* Dated Mar. 13, 1857. (No. 723.)

This refers to a patent of the patentee, No. 132, 1856, and consists in the construction of plugs, valves, or slides, by which the passage of the fluid through pipes can be prevented, and air be admitted into the pipes, by which means the fluid can be completely drawn off. Also to stopcocks or taps which, while the supply of the fluid is cut off, will allow the pipes to be emptied of their contents.

HESKETH, W. *Improvements in looms.* Dated Mar. 13, 1857. (No. 724.)

This relates to weaving patterns in the cloth, as crinoline and similar fabrics, the pattern varying according to the number of picks. The inventor fixes a bevel wheel on the tappet shaft to work into another bevel wheel on a cross shaft; at the other end of this cross shaft he fixes a pinion, which gives motion to a wheel with holes in the surface all round near the periphery. By means of these holes, he fixes a segment of the wheel, the said segment acting upon a roller and lever to govern the shed and shuttle.

JUVIN, E. J. N. *Improvements in producing printed surfaces.* Dated Mar. 13, 1857. (No. 725.)

This relates to certain electrotype and other processes for producing such surfaces as are printed from in the manner of letterpress printing, which surfaces are applicable for printing music, and are adopted to supersede surfaces composed and set up in separate characters as heretofore.

COWPER, C. *Improvements in the manufacture of artificial leather, or a substitute for leather.* Dated Mar. 14, 1857. (No. 726.)

A cloth or tissue of wool or cotton, &c., is prepared so as to present a smooth surface on one side of the face, and a soft surface on the back, like the flesh side of a piece of leather.

PROVISIONAL PROTECTIONS.

Dated October 5, 1857.

2552. James Combe, of Belfast. Improvements in machinery for hacking and preparing flax and other fibrous substances.

Dated October 16, 1857.

2648. David Guthrie and Josiah Vavasseur, of New Park-street, Southwark, civil engineers. A machine for cutting, chipping, or rasping dye-woods, or other similar fibrous substances, for the purpose of obtaining extracts.

Dated October 21, 1857.

2686. Robert Clark, of Glasgow, bleacher. Improvements in effecting the consumption or prevention of smoke, applicable to steam boilers and other furnaces.

Dated October 22, 1857.

2694. Marc Antoine François Mennons, of Rue de l'Abbaye-Montmartre, Département de la Seine, France, clerk. Certain improvements in machinery for the preparation of peat. A communication.

Dated October 24, 1857.

2708. James Thom, of Glasgow, manufacturer, and Hugh Mc Naught, of the same place, mechanic. Improvements in looms for weaving.

Dated November 4, 1857.

2797. Richard Laming, of Hayward's - heath, Sussex. Improvements in purifying gas, and in apparatus useful for that purpose.

2799. Francis Higginson, of Woodlands, Hampshire, Esq., Lieut. R.N. Submerging, extending, and laying down submarine, electric, magnetic, and every other description of submerged or immersed electrical telegraph cables, wire ropes, and combined wire, gutta percha, spunyarn, or other compound electrical cables whatsoever.

2801. Romain Ignace Charles Dubus, of Brussels, merchant. A method of treating certain plants or vegetable substances, in order to extract from the same—1st, a kind of fecula or farina proper both for alimentary and finishing or starching purposes; 2nd, an alcoholic liquor; and 3rd, a natural ferment or yeast.

2803. Charles Clay, of Walton, near Wakefield. Improvements in machinery for grubbing or cutting up weeds, and otherwise scarifying and cultivating land.

2805. Joseph Miller, of Alpha-road, Regent's-park, engineer. An improved arrangement of marine steam engines.

Dated November 5, 1857.

2807. Joseph Bunnett, of Deptford, engineer. Improvements in machinery for bending and shaping metals.

2809. George Robinson, of High-street, Deptford, engineer. Improvements in apparatus for shelling or hulling coffee and other berries and seeds.

2811. John James Cousins, of Leeds, woollen-merchant. Improvements in the construction of steam ploughs.

2813. William Sharman, of Sheffield. An improved metallic compound, applicable to the manufacture of useful and ornamental articles for which German silver and compounds resembling German silver are at present used.

Dated November 6, 1857.

2815. Frederick Lipscome, of the Strand, water-filter manufacturer. Improvements in the mode of conveying water and other liquids.

2817. Germain Canouil, of Paris, matches-manufacturer. Improvements in the manufacture of matches.

2819. Henry Bessemer, of Queen-street-place, New Cannon-street. Improvements in the manufacture of malleable iron and steel, and also in the manufacture of railway bars and other bars, plates, and rods from iron or steel so manufactured.

Dated November 7, 1857.

2821. Hugh Baines, of Manchester, architect. Improvements in machinery or apparatus for the prevention of accidents, applicable to hoisting and other lifting-machines.

2823. John Henry Pepper, of the Royal Polytechnic Institution, Regent-street. Improvements in displaying various devices when revolving discs or surfaces are used.

2825. William Wilson, of Canterbury - place, Newington, and James John Joseph Field, of Sussex-street, Wandsworth-road. Improvements in casting or moulding liquified and other substances.

Dated November 9, 1857.

2827. Walter Hardie, of Edinburgh, printer. An improved stereoscope.

2829. Pier Alberto Balestrini, of Brescia, Italy, gentleman. Improvements in machinery and apparatus for paying out submarine telegraph cables, and for regulating and controlling the paying out thereof.

2833. George Weedon, of Gloucester-place, Portman-square, and Thomas Turner Weedon, of Plumstead, Kent. An improved knife-cleaning machine.

2835. John Reeve, of Rutland-gate, gentleman. Improvements in propelling vessels.

Dated November 10, 1857.

2837. Thomas Rowcliffe, of Upper Park-place, Marylebone, operative engineer. Improvements in machinery for making and pressing bricks, drain pipes, and tiles, and in preparing material to be used for such like purposes.

2839. Joseph Townsend, of Glasgow, manufacturing chemist. Improvements in the manufacture or production of sulphurous acid.

2841. John Thomas Way, of Welbeck - street, Cavendish - square. Improvements in obtaining light by electricity.

2843. Henry Critchett Bartlett, of Ampthill-square, Hampstead-road. Improvements in the manufacture of paper.

PATENTS APPLIED FOR WITH COMPLETE SPECIFICATIONS.

2849. Edward Halliday Ashcroft, of Massachusetts. An improved mode of preventing the over-heating and bursting of steam boilers. A communication from J. Absterdam and W. Burnett. Dated 11th November, 1857.

2879. John Gedge, of Wellington-street South, Strand. Improved means for stopping or retarding carriages used on ordinary roads. A communication from W. A. Zempliner, of Vienna. Dated 17th November, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," November 24,* 1857.)

1919. I. L. Pulvermacher. Improvements in pipes and tubes for smoking.

1935. F. Burot. A new process for gilding and plating over silk, cotton, wool, and all other textile and fibrous matters.

1938. H. Lamy. An engine or apparatus for obtaining motive power by an improved method of applying steam, gas, or heated air.

1956. W. S. Clark. Improvements in machines for harvesting grain and grass crops, and in the automatic delivery thereof. A communication.

1959. G. P. Harding. Improvements in the manufacture of hats, caps, and other coverings for the head.

1963. F. Moulin. A new improved railway brake.

1964. W. J. Locke. Constructing an improved oil-can.

1970. H. Blandford. An improved combination of apparatus for distributing manure.

1974. J. Cox. Improvements in apparatuses to enable persons to progress in swimming.

1977. G. S. Mathews. Improvements in railway breaks.

1988. T. Roberts and J. Dale. Improvements in obtaining pigments from dye woods, and in the application of a pigment to printing paper hangings.

1996. R. Bolton. An improved mode of weighting the yarn-beams in looms used in the manufacture of cloth by steam power.

1997. G. J. Newbery. Improvements in window-blinds.

1998. F. H. Holmes. Improvements in magneto-electric and electro-magnetic machines.

2003. W. E. Newton. Improvements in reaping and mowing-machines. A communication.

2005. H. V. Cowham. Improvements in machinery for breaking or pulverizing land.

2006. J. Conway. Improvements in the production of copper rollers for printing calico and other fabrics.

2010. F. Warner. Improvements in ball and other cocks and valves.

2021. M. Clark and G. Bertram. Improvements in machinery or apparatus for cutting paper.

2029. J. Burrows. Certain improvements in steam engines.

2046. G. T. Bousfield. Improvements in apparatus for retarding and stopping carriages on railways. A communication.

2047. J. H. Bennett. Improvements in engines to be worked by atmospheric pressure, or steam, or by both in combination, and also in steam generators to be used therewith.

2056. R. Jackson. Improvements in protecting certain parts of the body from disfigurement by cutaneous diseases.

2060. P. A. F. Bobœuf. Improvements in preserving and otherwise treating animal and vegetable substances, and in the purification of oils employed therein, and which may be used for other purposes.

2090. J. Beale. An improved construction of rotary engine, applicable for pumping and measuring fluids, or for the production of motive power.

2156. H. Collingridge. Improvements in separating metallic substances from coffee, and in the apparatus employed for the purpose.

2200. P. A. Balestrini. A new method of, and apparatus for, sounding at sea, and in other waters.

2270. J. H. C. Löbnitz and J. M. Henderson. Improvements in steam engines.

2630. T. Restell. Improvements in breech-loading fire-arms, in projectiles, and in cartridges for breech-loading arms.

2680. R. Atkinson and T. Brearey. Improvements in loom pickers.

2757. W. Clark. Improvements in tackle blocks. A communication.

2819. H. Bessemer. Improvements in the manufacture of malleable iron and steel, and also in the manufacture of railway bars and other bars, plates, and rods from iron or steel so manufactured.

2849. E. H. Ashcroft. An improved mode of preventing the overheating and bursting of steam boilers. A communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2433. William Low.
2442. George Tomlinson Bousfield.
2449. Edouard Belmer.
2451. Henry Diaper.
2459. William Beasley.
2481. Samuel Alfred Carpenter.
2496. Joseph Gillott, jun., and Henry Gillott.
2542. Joseph Maudslay.
2564. Albinus Martin.

LIST OF SEALED PATENTS.

Sealed November 20, 1857.

1423. James Abbot, jun., Richard Handley Thomas, John Young, and James Edward Hunt.
1424. Joseph Jakens.
1434. William Todd.
1453. William Carron.
1458. Thomas Humphrey Roberts.
1459. Thomas Silver.
1460. Gautier Olivier de la Barre.
1461. John Phillips.
1478. William Scott Underhill.
1606. William Wright.
1634. Alfred Vincent Newton.
2230. Frederick Albert Gatty.
2508. Rudolph Bodmer.

Sealed November 24, 1857.

1464. William Robertson.
1489. Robert Parkinson and John Standish.
1491. William Iriam Ellis.
1492. Henry Crompton.
1497. James Léonard Codet-Négrier.
1499. Randal Cresswell.
1502. Richard Archibald Brooman.
1509. Richard Edward Hodges.
1510. William Hale.
1515. Alexander Simpson.
1516. William Wilber.
1521. James Merrylees.
1555. James Stevens.
1562. William Jones.
1567. John Jobson.
1579. Richard Roberts, Wright Shaw, and Samuel Shaw.
1599. Alfred Jean Vincent Doptet.
1605. William Wright.
1630. Arthur Dunn.
1636. George Farrell Remfry.
1642. Joseph Michell Paule.
1681. William Edward Newton.
1692. Salomon Sturm and Henry Emile Bour.
2182. Peter Carmichael.
2250. John Penn.
2265. Thomas Brown.
2392. Henry Rawson.
2407. Emile Alcan.
2451. Daniel Forrester.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Dates of Registration.	Nos. in the Register.	Proprietors' Names.	Addresses.	Subjects of Design.
Oct. 28	4028	C. Rowley and Co.	Birmingham	Belt Clasp.
Nov. 4	4029	C. L. Alexander	Clerkenwell	Button Fastener.
5	4030	A. Pilbeam	Adam-street, Adelphi	Smoke Preventing Chimney-pot.
9	4031	Burgess and Key	Newgate-street	Photographic Plate-holder.
11	4032	S. Smith	Birmingham	Grater or Mill.
16	4033	J. H. Hodd	Hill-street, Peckham	Fuel Economizer.

PROVISIONAL REGISTRATIONS.

Oct. 31	934	A. Lazarus	Whitechapel	Seamless Coat.
Nov. 5	995	J. Richardson	Manchester-square	Covering for the Teeth.
13	936	G. Kings	Erdington, Warwickshire	A Double Drum.
17	937	R. Bradley and W. Gibson	John-street, Fitzroy-square; Pratt-street, Camden-town	Cartridge Nipper.
18	938	H. J. and D. Nicoll	Regent-street and Cornhill	Cape or Cloak.
,,	939	C. Baker	Broadway, Westminster	Spinal Support.

CONTENTS OF THIS NUMBER.

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Mechanics' Magazine.

No. 1791.] SATURDAY, DECEMBER 5, 1857. [PRICE 3D.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

BRIGHT AND DE BERGUE'S PATENT APPARATUS FOR LAYING DOWN SUBMARINE CABLES.

Fig. 1.

Fig. 2.

BRIGHT AND DE BERGUE'S PATENT APPARATUS FOR LAYING DOWN SUBMARINE CABLES.

We this week propose to describe the apparatus which Mr. C. T. Bright has patented, in connection with Mr. C. De Bergue, and which was referred to in our first article last week. The invention consists in so arranging drums, pulleys, or reels, (outside a supporting frame), over the periphery or surface of which the cable passes during its transit from the hold of the vessel to the water, that the cable cannot slip and run out, without causing the drums or reels to revolve on their axes at a speed equal to that at which the cable is passing; and in the application to drums or reels, directly or otherwise, of a friction brake, capable of being adjusted and regulated so as to cause more or less tension or strain on the cable, as may be required, according to circumstances; in the employment of an indicator, in combination with a drag or brake, to show the amount of tension or strain on the cable; in the employment of a steam engine, or of any other suitable power, to run the paying out apparatus in a reverse direction, where it may be required to raise up the cable; and in the employment of floats or buoys to be attached to the cable at intervals, and allowed to run into the water with it, and sink with it, when required, in order to take off or reduce the strain or tension of the cable.

Fig. 1 of the engravings on the preceding page is a view in plan of an apparatus constructed according to this invention for laying submarine telegraph cables, and fig. 2 is a side elevation thereof; *a a* is the frame of the apparatus; *b b* are plummer blocks secured on the frame, *a, a; c c* are shafts working in the plummer blocks, *b, b*. To the ends of these shafts are keyed or otherwise fixed the grooved pulleys, *e, e*, over and around which the cable is passed, as indicated by the arrows in fig. 2; *d, d', d'', d'''* are cog wheels on the shafts, *c, c*, gearing respectively into one another; *f* is a brake shaft also working in plummer blocks. On this shaft, *f*, an intermediate cog wheel, *g*, is fixed, which gears into the cog wheels, *d', d''*; *h h'* are brakes and brake boxes on the shaft *f*. The brakes are formed of collars which clasp and bear upon the shaft, and are acted on by means of screws passing through the brake boxes. One end of the screws is connected by spur wheels and pinions, *i, i*, with the hand wheels, *k, k'*, by which they are worked; *l l'* are levers joined to the brakes, *h, h'*, and to these levers, counter levers, *m, m*, are attached, which are carried or supported on standards, *n, n*. The levers, *m, m*, are jointed or linked to a balance lever, *o*, which by means of any suitable mechanism (such, for example, as Salter's balance) indicates on a dial the strain or tension exerted on the cable, as it is payed out from the ship.

The cable, in its transit from the hold to the water, is wound over and around the pulleys, *e, e*, as before described. The paying out of the cable causes the pulleys, *e, e*, to revolve, and these pulleys being on the shafts, *c, c*, carry round the cog wheels, *d, d', d'', d'''*; the rate at which they revolve is regulated and controlled by the intermediate wheel, *g*, and the speed at which it runs is regulated or stopped at will, by means of the brakes, *h, h'*, worked by the hand wheels, *k, k'*. The speed of the pulleys, *e, e*, and therefore of the cable which passes round them, may consequently be maintained at any required rate, or varied, as desired, by suitably adjusting the pressure on the brakes. If the cable is running out too fast, the hand wheels, *k, k'*, are turned in such manner as to increase the pressure of the brakes upon the cylinders, *h, h'*, on the shaft, *f*, to reduce the speed thereof, and consequently of the intermediate wheel, *g*. The wheel, *g*, gearing with the wheels, *d'*, *d''*, and these again with the wheels, *d*, and *d'''*, reduces their speed, and through them the speed of the pulleys, *e, e*, and thereby that at which the cable leaves the ship. If the cable is not paying out fast enough, the reverse operation takes place. The apparatus can be reversed to draw the cable on board by connecting a crank or a wheel to the brake shaft, *f*, and driving it by means of a steam engine, or any other motive power.

BIG BEN.

To the Editors of the Mechanics' Magazine.

Gentlemen,—As all ornaments and inscriptions on bells tend to injure the tone, pray use your powerful pen in trying to prevent the new "Big Ben" having anything of the sort upon it, or any other whim which may cause irregularity in the thickness of it. I am, Gentlemen, yours, &c.,

Musicus.

P.S.—Surely Sir B. Hall and Mr. Denison are not vain men? "*Verbum sat.*"

ON THE PROTECTION OF WOOD FROM FIRE.

A series of experiments has recently been made, on a small scale, at Portsmouth Dockyard, before the Admiral Superintendent, the Master Shipwright, the Superintendent Director of Works, the Director of Police, &c., at the suggestion of Mr. Hay, the Admiralty Chemist of the Establishment, who proposes to pay the beams and bulkheads of ships, before they are painted or white-washed, with a composition consisting chiefly of silicate of soda, for the purpose of checking the spread of fire in the event of accident. The prime merit of the proposal belongs to Mr. Abel, the talented and experienced chemist of the War Department, who has given much attention to the subject. At the same time it is due to Mr. Hay to say that, as the chemical officer of the Board of Admiralty, he has strenuously seconded the proposals of Mr. Abel, and has demonstrated by practical experiment the immense advantages which would result from the preparation of ship timber in the manner proposed. We have tested specimens of the wood prepared with the aforesaid silicate, and find the action of fire upon it much impeded by the treatment to which it has been subjected. In circumstances in which unprepared wood rapidly fires and burns away in a strong flame, the prepared wood slowly smoulders, with very little flame indeed, leaving a much denser charcoal than the other. The cause appears to be that the silicate, instead of becoming volatilised, fuses, and clings to the wood, cutting off the atmosphere from it; so that wood which, if unprepared, would lead flame rapidly along it, and thus spread the fire abroad, will, when prepared, confine, or greatly tend to confine, the fire to the spot at which it commences.

In order to bring this subject more fully before our readers, we give the following paper, prepared by Mr. Abel for the "Professional Papers" of the Corps of Royal Engineers, together with an extract from a report on experiments made at Chatham, from Col. Sandham, R.E., and Mr. Abel, to the Inspector-General of Fortifications.

REMARKS ON THE PROTECTION OF WOOD FROM FIRE. BY F. A. ABEL, ESQ., CHEMIST TO THE WAR DEPARTMENT.

The attention of practical men has been for some years past directed, from time to time, to the importance of affording to wooden erections some degree of protection from the effects of fire; and numerous plans have been proposed, and to some extent tested, for lessening the combustibility of wood, and for covering its surface with a protective coating more or less unalterable by fire.

The simple application of lime or clay-wash, for example, has been found to afford some slight protection to wood, although the tendency of such materials to peel off the surface of the wood (into which they do not in any way penetrate), by exposure to heat, and the rapidity with which the coating is destroyed by atmospheric influence, render them very ineffective agents.

Several processes have been patented, even recently, for the protection of wood from fire. Some idea of the general nature of such processes will be conveyed by the following extract from an official report made on this subject:

"The importance of obtaining an effective method of reducing the combustibility of wood, or even of protecting its surface from fire, has led to an examination into some of the methods of accomplishing this, which have been lately patented, and of the general nature of which the following is a brief statement.

I.—"*Mr. Maugham's Patent* consists in saturating dried wood with an aqueous solution of phosphate of soda and muriate or sulphate of ammonia, in certain proportions.

"It is believed by the patentee that these salts will be so affected by each other, and by the action of heat, that the fibres of the wood will be protected by an incombustible coating, while a quantity of vapour will be generated by the volatilisation, and partial decomposition, of the ammoniacal salts, which will possess the power of extinguishing flame.

"The same objects are believed to be obtained by—

II.—"*Lieutenant Jackson's Patent Process*, by which wood is impregnated with a solution of salts of zinc and of ammonia.

"The same means are adopted in both of these processes for saturating the wood.

"It is packed into large cylinders, from which the air is then exhausted, the liquid being afterwards forced in with a pressure of 150 to 200 lbs., which is maintained during one or two hours. It is the same method as that employed in patent processes for preserving timber from decay.

"I am not aware whether Mr. Maugham's process has been submitted to any extensive practical test. Numerous experiments were, however, instituted on Lieutenant Jackson's process, under the direction of Mr. Brunel.

"Specimens of seventeen different kinds of wood were prepared; corresponding pieces being kept unprepared, and others covered with a coating of paint. Their powers of resisting fire were tested by piling the prepared, unprepared, and painted specimens round a perforated sheet

iron surface, filled to the top with a bright coke fire.

"In most cases the prepared wood resisted the action of fire for a longer period, and, when removed from the fire, ceased burning sooner than the unprepared specimens.

"It was also evident that light porous woods were more efficiently protected than those of a denser character.

There is no doubt, therefore, that the combustibility of wood is more or less diminished by either of the above methods of treatment, although the protective action must be ascribed to the indestructible compounds with which the wood is to some extent impregnated, far more than to the vapours evolved by the decomposition of the small quantities of ammoniacal salts forced into the wood.

"Although by the impregnating process adopted in the above patents the preparative solution is believed to be forced into the very centre of the wood, it is essential, if such a result is to be obtained, that the solution should be weak, since it is impossible to force strong saline solutions thoroughly into wood.

"It is evident that the protective action of the salt cannot, under these circumstances, be very powerful.

"Were it possible, on the other hand, to employ stronger solutions, the expense of the processes would be considerable.

"The necessity of costly apparatus for impregnating the wood is also a matter of serious moment."

The patentees of some of the wood-preserving processes go so far as to state that they are enabled to render wood incombustible or uninflammable, and such statements have tended to lead to the presumption that a thoroughly effective protecting agent should have the power of depriving wood of its combustibility.

It will be readily understood, however, that even if a piece of wood could be most thoroughly impregnated with a solution of some strength, of matter unalterable, or at any rate only fusible by continued exposure to heat, the amount of protective material thus deposited in the pores of the wood, although it might be considered to surround each particle of fibre, would not prevent the destructive distillation of the wood by the effect of heat, the result of which would be the disengagement of inflammable vapours from the wood, and its ultimate complete ignition, if maintained for a sufficient period in the vicinity of highly heated or burning matter; or if, on the other hand, the protective agent employed be convertible by heat into vapours possessing the property of extinguishing such fire as they may completely surround, such vapours might have the effect of partially or completely extinguishing the fire in a piece of ignited wood, *after* its removal from the source of heat or fire, but otherwise the volume of vapour generated from the preparation used would be but slight, as compared with the inflammable vapours evolved from the overheated wood, and would have no perceptible effect on the combustion of these, while the scorched or charred woody fibre would be less efficiently shielded from the effect of flame than by the coating formed from an indestructible preparation.

It does not therefore appear reasonable to expect more from the most efficient protective coating or impregnating material than—

1st. That it should considerably retard the ignition of wood exposed for some length of time to the effect of a high temperature, or of burning matter in its immediate vicinity.

2nd. That if the vapours which the wood will emit, by continued exposure to heat, become ignited, the flames thus produced shall not readily affect the fibre of the wood, and shall cease almost directly on the removal of the wood from the source of heat; and

3rd. That prepared surfaces of wood, when in actual contact with burning unprepared wood, shall have little tendency to ignite, and thereby cause the fire to spread.

(*To be continued.*)

THE LAUNCH OF THE "LEVIATHAN."

Thursday, Dec. 3, 1857.

On Thursday, the 26th, the shackle that broke having been replaced, and another chain of 2½ inches laid across, the strain was then applied, and it was found that something was giving way. At low water it was ascertained that the anchor had come home. Some piles were then driven at the edge of the wharf in a line with the fore foot, and a purchase rigged out, consisting of two treble blocks, and a ½-inch chain fall led to a very powerful crab. On Friday, upon heaving the midship purchases taut, another link of the 3 inch square chain broke, and the other anchor and stock both broke—the stock across the centre and the anchor across the crown. (It is but justice to state that the anchors are mooring anchors, made by cutting one arm off from old anchors long out of date, some of them being a century old, and certainly not more than one-third the strength of those now made.) The 3-inch chain was repaired in the course of the night, and on Saturday morning, the chains being all hove taut the first thing, at a quarter past ten the order was

given to pump away upon all the presses, and in less than two minutes the ship started fore and aft, and, by keeping the pumps, &c., going rather faster forward than aft, in the course of an hour the ship was got square on the ways, and kept steadily on at a speed varying from ⅝ to 1¼ inches per minute. About two o'clock it became evident that the anchor to which the after purchase was attached, and which had hitherto held, was coming home.

After this all went very steady until five P.M., when the board at the fore end of the foremost cradle showed that the ship had gone 181 inches, and the one aft 156 inches, in the course of the day. Operations were now suspended, and a party of men set to get a purchase aft similar to the one forward (a block of granite weighing 11 tons having been sunk just within low-water mark for the purpose). This was accomplished by eight o'clock on Sunday morning. About nine the chains were again hove taut, and when the pumping was about commencing the 3-inch mooring chain again broke, rendering the whole midship purchases useless. The after chain held on for a time, and then commenced dragging again, and the purchase fast to the granite was also evidently useless. The pumps were at work, but no movement could be obtained. It was now suggested to get all the screw jacks that could be obtained, and fix them on the ways to assist the presses. This was done by half-past two, and at twenty minutes to three the monster was again in motion. In the course of the afternoon, two blocks were broken at the fore foot, one after the other. These blocks had been in use in getting in the machinery, and had frequently had over forty tons on them. Luckily, no person was injured. When the men left off at five o'clock, the boards showed 282 inches forward and 256 aft. When the tide went down, it was found that the block of granite was pulled out of the hole, and turned upside down. The lower block was then unshackled, and shackled to the standing part of the 2½-inch chain, connected to the moorings. On Monday morning, more screws being obtained, at five minutes to nine she was again in motion, keeping steadily on at a speed of about ¾ inches per minute, until one o'clock. After dinner, she was, as usual, rather sluggish. Some chain being overhauled from the drum, and all the pressure applied, at two o'clock she started off 9 inches aft, and 5 inches forward, but was stopped by the chains and drums alone, without the friction bands being applied. During the previous two days, double timbers, or two pieces bolted together, had been used between the presses and the cradle; but now from some cause or other not clearly explained, a single piece was put in at the after press on the fore cradle. This quickly buckled up and broke, and, shortly after, on getting to work again, the press burst. This put a stop to all further proceedings for a time, the boards showing 418 inches forward and 432 aft.

It having been ascertained that there were presses and pumps in the immediate neighbourhood, and that the owners were willing to lend them, Mr. Brunel determined to have more power, and there are now four more presses fixed close to the cradles. Two of the midship purchases have been repaired, and one of Trotman's anchors laid down. This anchor, being nearly half as heavy again as those that gave way, it is hoped will be of some service. In fact, Mr. Brunel will start this day with about double the power he has hitherto had.

Thursday, 4 P.M.

The ship has started several times this afternoon, through distances of 9, 13, and 8 inches respectively. By half-past two (when our express left) she had moved 4 feet 2 inches.

MACHINERY FOR WORKING WOOD

At the meeting of the Institution of Civil Engineers, November 24th, 1857, the proceedings were commenced by the reading of an appendix to Mr. G. L. Molesworth's paper "On the Conversion of Wood by Machinery." (See *Mech. Mag.*, No. 1790, p. 509.)

The manufacture of casks by machinery was cited as an example of a branch in which many failures had occurred, in consequence of the machines having been frequently designed without a view to effecting economy of material, so that the waste of valuable wood was not counterbalanced by the saving of labour. The best machines in use for performing the following processes in the manufacture of casks were briefly described.

Hamilton's machine for sawing curved ship timbers was described as having an inner gate, and the blade so hung as to allow of a transverse as well as a swivelling motion, for curvilinear work; the log being so arranged as to be turned on its axis whilst travelling, and to be cut to any desired bevel. Green's method of adapting an indicator roller to this machine, for cutting variable bevels from a small-scale diagram, was also mentioned.

The largest circular saws were stated to be those used for cutting veneers from the log; their size, velocity, and mode of action were given, as well as the attempt to supersede them by a revolving knife-edge, with the causes of its failure. The Russian method of cutting veneers was briefly touched

upon, as well as the reasons for its non-adoption in England; and the French method, with a reciprocating knife-edge, was also described.

A description of Jordan's wood-carving machinery was given, with his method of producing a species of floating movement in the table carrying the pattern and the work, under a frame furnished with a series of drill cutters and a tracing knob, so as to produce several copies simultaneously from one pattern; the plan of carving under-cut parts by swivelling the pattern and work simultaneously, was also described.

The appendix concluded with an account of Messrs. Ransome and May's manufacture of compressed railway keys and treenails, and also of the mode adopted in Her Majesty's dockyard, Portsmouth, of shaping treenails cleft from timber of irregular or twisted grain.

A description was given of Wilson's machinery at the Midland Counties Timber Company's Works at Banbury, for the conversion of wood into mop and broom handles, of which very large quantities were manufactured. Cylindrical gouge cutters were used, so that by turning them gradually in their sockets, they always presented a cutting edge, which would work for sixteen hours without sharpening, and a tool would last three months. The surface produced was excellent, and the machine was now about to be used for making pencils.

The carving machinery invented by Mr. Jordan, and used for the decoration of the New Palace, at Westminster, was alluded to; and a description was given of the ingenious machines, also invented by him, for making the frames of school slates, at Colonel Pennant's quarries, near Bangor. The logs of American birch were first cut up by frame saws; the planks were then seasoned for six months, and were afterwards cross cut to proper lengths, passed over a series of circular saws and grooving cutters alternately fixed on the same shaft; the mortises and tenons were cut in two other machines, the end mortises, tenons, and shoulders were then cut, and the slates encircled by four of these pieces. The frame thus formed was then laid against two stops, and a pair of drills descended upon the opposite corners, making two holes; it was then reversed, and another pair of holes were made in the other two corners, pegs were inserted, and the work was completed. Up to that point the result was excellent, but it had been found impossible entirely to finish the work with the delicacy with which the human hand could do it. In all such machinery, the vital importance of high speed and perfect balance were insisted upon, and many curious instances of failure, resulting from neglect of these points, were given.

Messrs. Ransome and May's treenail and key machines were further described, and the advantages of the pendulum saw for cross cutting were strongly insisted on.

Green's stave-cutting machinery was explained, and the great quantity of work which could be executed by it was shown.

GIBSON'S SELF-ACTING RAILWAY SIGNALS.

After the meeting of the Institution of Civil Engineers, Nov. 24th, a model was exhibited of Gibson's Self-acting Signal and Telegraph for Railways. This apparatus was described as being intended to supply the want of a system of railway signalling, which should be efficient, and whilst answering every purpose for which railway signals could be required, should be simple in construction, and not liable to be misunderstood, or to get out of repair; being, at the same time, independent of the attention or the neglect of servants.

The apparatus consisted of a continuous arrangement of signalling set in motion by the engine, which, in passing over a lever placed closed withinside the rail in any desired situation, caused a signal-post (No. 1) to rotate partially, and so to indicate to the following train the close proximity of a preceding train. The signal post (No. 1) remained in this position until the engine arrived at the next signal post (No. 2), the lever opposite to which, when depressed by the engine, caused it to rotate similarly to the signal post (No. 1) previously passed, which was at the same time replaced in its original position. The engine then reached signal post (No. 3), and it and No. 2 would be simultaneously acted upon as were Nos. 1 and 2. Then No. 4 received the responsibility, and released No. 3, and so on. It answered equally well by night and day, and the present signal posts could be adapted to it.

By the same motion of the horizontal levers, audible or visible telegraphic communications could be made with any station or stations, either in advance or in the rear of the moving train; thus indicating, by the continual ringing of a bell, if necessary, the approach, departure, present position, or passage through a tunnel, or over any dangerous part of the line. On foggy or stormy nights, or where there were sharp curves, &c., this would be found very valuable.

Another important part of the system was the contrivance for the self-acting contraction and expansion of stretched wire, by means of which hand signals, &c., could be acted upon at a distance of 2,000 yards

being far beyond the present working distance, and the wire, both in summer and winter, would always be at the same degree of tension.

The whole apparatus was described as having been in efficient action for some time, at Binn's Junction, on the North Eastern Railway, where thirty trains ran daily over it, to the perfect satisfaction of the engineers and the officers of the line.

SIR F. C. KNOWLES' PATENT IMPROVEMENTS IN THE MANUFACTURE OF CAST STEEL.

The following is the description which Sir Francis C. Knowles gives of certain improvements in the manufacture of cast steel recently patented by him:—The first part of this invention is the construction of furnaces, either air or blast, whereby the manufacture of cast steel from the ore becomes a continuous operation. This furnace, whether an air or a blast furnace, consists of two essential parts, the outer part or the heating furnace, and the inner part called the reducing, cementing, and fluxing, or the "smelting" furnace. The complete separation of these two parts allows of the employment of coke, even the sulphurous, for the purpose of heating, and of charcoal for that of reducing the oxide of iron in the ore, and carbonising the metal into the state of steel before it is smelted and separated from the cinder or scoriæ. These furnaces are open at the top so as to allow of their being fed continuously, the one with coke, the other with the appropriate materials for making steel from the ore by reducing, cementing, and fluxing. In another form the furnace is reverberatory, and the cementing and reducing and smelting chambers are erected within it, and are fed through the top of the heating furnace where they are furnished with stoppers or lids. The heating furnace in this case is fed as usual with coal, and in all cases the air furnaces are provided with dampers for regulating the draught and the heat. Where a blast is used the inventor prefers hollow fire bars through which a current of water passes to keep them cool. In the reverberatory heating furnace the smelting cylinders have no crucible, but each has a tap hole accessible by a door in the outer furnace, and when the fusion is complete they are all tapped at once, and the metal and cinder let into a common crucible as in an ordinary air foundry cupola. This form is also applicable to the smelting of steel ingots for heavy castings. The next part of this invention relates to the making (in pots or in one of the afore-described or other furnaces) of steel directly from those richer ores of iron which are free as can be from sulphur and phosphorus. For this he employs several kinds of fluxes, namely—1. Cyanide of potassium or sodium. 2. Cryolite, or fluoride of sodium and aluminium. 3. Pure alumina, or kaolin combined with quick, or with or without quick lime, or caustic magnesian lime derived from magnesian limestone.

SOCIETY OF ARTS.

A special general meeting of the members of the Society of Arts was held on Tuesday evening last, for the purpose of putting the members in possession of the questions to be considered. The attendance of members was numerous.

Mr. Bodkin was called to the chair on the motion of Mr. Dilke.

Mr. Le Neve Foster, the secretary, then read the old bye-laws which it was proposed to revoke.

The bye-laws to be substituted for the old ones were then proposed.

Mr. Baines then read a memorial based upon the mistaken assumption that the council had resolved to discontinue the examinations.

Mr. Baines then said, on learning that it was not the intention of the society to abolish the examinations, a meeting of the central committee was held in Leeds on the 28th of November, at which a resolution was carried to the effect that the committee regretted to find that the council contemplated abandoning oral examinations, and that they think it their duty to express their high sense of the zealous exertions of the Rev. Dr. Booth in introducing and conducting the examinations.

Several other memorials had been received by the secretary.

Mr. Chester proposed the first resolution. He said the council were surprised at the report which had gone abroad that it was their intention to suppress the board of examiners permanently, and were going to give up the system of examinations. So far from their giving it up, the question had never been raised in the council. All they desired was to bring the board of examiners into harmony with the provisions of the charter. The council treated the board of examiners with the greatest respect, and thanked them for their services, but they could not consent to have in the society a body of persons quite independent of the council. In the new bye-laws they confined themselves to the students of institutes, the council having resolved to give up the examination of the pupils of private schools. Mechanics' institutes had an independent and well-known public character; they were not conducted as commercial speculations. Private schools were conducted commer-

cially. The Society of Arts must not attempt to set itself up as an educational society or as a university. It was an institution for the encouragement of art, manufactures and commerce, and it was upon that basis they desired to proceed. To set up as a great university would only bring ridicule upon them. Mr. Chester, whilst admitting the value of oral examinations, contended that, circumstanced as the Society of Arts was, the system of paper examinations was the best. Oral examinations would entail too much expense on the society. In conclusion, he moved that the five old bye-laws be revoked, and the four new ones substituted for them.

The resolution was put and carried.

Mr. Baines said that, with regard to the bye laws, the objections to them were so strong that he could not hold up his hand in their favour. He believed that it would do the greatest possible injury to depart from the plan of oral examination, and he therefore proposed the following resolution:—"That, in the opinion of the meeting, it was desirable to continue the present system of examination, including oral examination, by examiners of the Society of Arts."

Mr. Watts seconded the resolution.

Mr. Crace thought that the society's main object should be the promotion of arts, manufactures, and commerce. They could not become the general education examiners for the entire country.

Mr. Webster said, the best way of promoting arts, manufactures, and commerce, was to promote education amongst the working population. At the same time he hoped the council would not allow themselves to be diverted from the main objects of the society.

Mr. W. Hawes said they could extend the written examinations to the whole country, but the oral examinations must necessarily be confined to a few places, because their funds would not allow them to send examiners throughout the entire country. They were told that the system of oral examination was Dr. Booth's. It was not so. He thought the adoption of Mr. Baines's resolution would cast a stigma on the council.

Mr. Scott thought that the society should confine their attention to the objects for which it was founded, namely, the promotion of arts, manufactures, and commerce.

Mr. Wilkinson said the question before them was not what was the best mode in itself of conducting examinations, but what mode was most within the means and scope of the society. He therefore begged leave to move the following amendment to Mr. Baines's resolution:—"That the meeting, while it recognises the value of oral examination, continues to have confidence in the council of the society, and entrusts to it the duty of working out the mode of examinations in the institutions in union."

Mr. M'Gregor seconded the amendment.

After a few words from Dr. Booth, from Mr. Chester in support of his views, and from Mr. Baines in support of his resolution, the amendment and resolution were put to a show of hands, which the chairman decided to be in favour of the amendment. The announcement was received with cheers by the friends of the council.

APPLICATION FOR PROLONGATION OF A PATENT.

EMPSON'S PATENT FOR LINEN BUTTONS.

Judicial Committee of the Privy Council, November 26.

Present—Lord Justice Knight Bruce, Lord Justice Turner, the Right Hon. Pemberton Leigh, and the Right Hon. Sir E. Ryan.

This was a petition for the prolongation of a patent granted to Mr. Empson in January, 1844, for an improvement in the manufacture of linen buttons. The ground upon which the extension of time was sought was, that the petitioner had been compelled, in consequence of losses incurred by legal proceedings, to make over the patent to another person, and to pay him for a licence to use it, and had therefore not received, since the granting of the patent, more than £6,493. This sum, it was contended, was less than the ordinary profits of the trade in which the petitioner was engaged, and was not a fair remuneration for the ingenuity he had displayed in the invention.

Mr. Hindmarch appeared for the petitioner; Mr. Welsby watched the case on the part of the Crown.

Mr. Pemberton Leigh said that, assuming everything alleged in the petition to be true, their Lordships were of opinion that there was not the least pretence for granting any extension of the patent.

THE VOYAGE IN THE AIR.

We have received from our excellent correspondent, Mr. J. Pitter, a very able letter, in which he discusses the article entitled "A Voyage in the Air," published in our Magazine for Nov. 14, from *Les Contemporains*. We do not think the subject sufficiently important to occupy the space which the letter would require; but it may be well to state that Mr. Pitter's paper casts great discredit upon the statements of M. Henri Page, and convicts that gentleman of serious self-contradictions. We need hardly say that we had no confidence in his narrative.

NEWALL'S PATENT ELECTRICAL WIRE ROPES.

Mr. R. S. Newall, the well-known manufacturer of electrical wire ropes and cables, has patented an improved method of preparing them, which he thus describes:—"Hitherto it has been usually the practice to make such conductors of single wires coated with gutta percha, or other insulating substance, or of several wires laid together into a strand, or otherwise, and coated with gutta percha, or otherwise insulated. If the strand, as is frequently the case, be composed of seven small wires, a large surface in the aggregate is exposed to the insulating substance. This large surface acts prejudicially when the wires are insulated and immersed in water, as it increases the difficulty of getting rid of what is known as 'the charge,' in proportion to the surface of the wire exposed to the insulating substance. The present invention consists in effacing the irregularities of the external surface of the strand by reducing it to a cylindrical or other regular form, by drawing the strand through dies, or by passing it through rollers or similar apparatus, or by filling up the interstices with tin or other suitable metal, and reducing the same to the required dimensions with an uniform surface."

THE WAVE-LINE SYSTEM.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Several years ago I invented what I call the wave-line, not knowing that it had been already invented, for the purpose of applying it to ship building, such invention being the result of the course of reasoning contained in my paper. I soon, however, found that this wave-line had been already described in Captain Fishbourne's work on Naval Architecture, and I believe that Mr. John Scott Russell makes use of the same curve.

Until very recently I was not aware that the prolate cycloid, shown by "Nauticus," was generally considered to be the wave-line. I would not, on any account, make use of that curve in ship building.

I am very partial to facts; but I must decline to accept, as evidence of the unsoundness of my theory, any data gathered from vessels not constructed on my principle. I will undertake that no vessel properly constructed on that principle could be improved by filling up the concave bow.

If "Nauticus" will drop a cork into the water a foot or two from the side of the cutwater of a sharp built steam vessel in motion, he may observe that it will never touch the side of the vessel, nor will it move a single foot *ahead*, while its motion at right angles to that of the vessel is so rapid as to keep it clear of the vessel's side. Thus the practical effect of the vessel's motion is to drive the water that floats the cork in a direction perpendicular to the vessel's motion.

I am not so ignorant of dynamics and hydrodynamics as not to know that there is an incident *pressure* in a different direction to the perpendicular, as there must also be in the wedge, screw, &c.; but the practical effect is as I have stated. If there were no such pressure there would be no occasion for the 200 horse-power to drive the vesel. In strictness I might have calculated the effect of the bows according to the varying angles of each of the twenty divisions (page 438), but the total effect would have been exactly the same, and I prefer the simpler mode.

I have no doubt mistakes have been made in attempting to adopt the wave principle by even *eminent* firms; but I would remind "Nauticus" that a fine wave-bow ought to be curved up below the water-line like the yacht *America*, and that part of this bow should do the duty of a bowsprit, a small jib-boom being all that is required beyond the stem. I have often been amused to see ship-builders strain at a gnat and swallow a camel in resisting every attempt at a fine bow, and fearlessly building a broad overhanging stern, that must have a fearful tendency to make the vessel become logged.

A few more words on power and speed. Suppose (for example) a vessel (which I will call No. 1) of 20 feet beam, 100 feet long, and 100 square feet of midship section, travels ten miles an hour with fifty horse-power; from this, as data, I should expect a vessel (No. 2) 200 feet long, 40 feet beam, and 400 square feet of mid. sec. to require 200 horse-power to propel her ten miles an hour, and No. 2 would be of eight times the capacity of No. 1. Again; a vessel (No. 3) 100 feet long, 40 feet beam, and 400 square feet mid. sec., would be only four times the capacity of No. 1, but would require eight times the power (viz. 400 horses) to propel her ten miles an hour. And a vessel (No. 4) of the same midship section as No. 1, but 200 feet long, would only require 25 horses-power to propel her ten miles an hour (one-eighth the power of No. 2, although one-fourth the capacity); but as she could conveniently carry 100 horse-power, she would, with that power, travel twenty miles an hour.

Every foot of midship section causes a certain consumption of coals; and every foot judiciously added to the length causes a saving of coals.

I am, Gentlemen, yours, &c.,

T. Moy.

1, Clifford's-inn, Nov. 24, 1857.

DRAKE'S IMPROVEMENTS IN CANNON.

To the Editors of the Mechanics' Magazine.

Gentlemen,—So far as my improvements in cannon go, I have been guided by personal observation, such as the deadly experience of the revolutionary age, and the consequent wars that followed, under the reign of Napoleon, gave me the opportunity of consulting; and, as those wars were calculated to define the limits of ordnance more effectively than preceding experience, I have not ventured, as before remarked, to carry the calibre of cannon above 13 inches for spherical projectiles, and less in proportion to weight, for those of a conoidal and cylindrical form. It was never a question with me how far the mechanical construction of ordnance could be carried above those limits.

The last and largest of the two monster mortars at Woolwich, which is upwards of 50 tons in weight, I have inspected, and I am quite ready to admit, it is a noble example of mechanical skill; and we have had proof that the 36-inch shell of 26 cwt., fired from Lord Palmerston's mortar, can perforate the ground to the depth of 10 feet in its fall from a short range. But of what consequence to things on the surface would it be, if, in bursting in that position, it sent up the earth like the ashes of a volcano? His Lordship, I think, must see, even if his mortar were as portable as a 13-inch mortar of 82 cwt., that 13 shells, each about 200 lbs., falling simultaneously from a given number of mortars, being about the proportion in weight to one monster shell, would scatter destruction thirteen times greater, and repeat it four to one with the monster mortars. Guns and mortars are things of utility, and utility dictates their size for the various duties for which they are required; and when I state that my 12-inch guns are adequate to destroy the largest ships of war constructed or likely to be constructed for ocean purposes, I am sure it will be acknowledged by practical gunners that nothing larger is wanted to prevent ships from approaching our shores, and for which they were invented.

Longer range is the order of the day, and I have carefully given my attention for years to the required demand; but I have no idea of ten mile ranges, and consider if cannon can produce *positive results* at less than half the distance, with a rapidity of three shot to one with the present class gun, and a less complement of men, a really useful range is effected. At the same time I feel equally convinced, that no gun yet made or submitted to public notice can exceed the range of those I have invented. We have large calibre and long range guns, of foreign as well as English invention, such as those at Woolwich and Dover; but what Government of the present day will repeat the example, conscious, as we all are, no real advantage belongs to them; and that the difficulty and danger of loading makes them more fit for ornamental than useful purposes?

Having noticed, in my last communication, the bursting of 8 and 10-inch cast-iron guns, it must appear unaccountable to your readers why the Government, with their professed experience, which fixes the safety of cast-iron cannon at a 6-inch calibre and 32 pound shot, should have increased the calibre, not only by casting new guns, but by reboring and increasing the calibre of guns with a given weight required for the safety of the smaller bore, and then have fired them at mortar instead of gun elevations, which should not exceed 9°.

The guns to which I called your attention were fired at bursting elevations, with the charge of powder and weight of shot for horizontal firing; and when I inspected them, although I was shocked with the results, I was not surprised at their bursting.

We have proof that cast-iron can be applied with safety in the construction of mortars up to 13 inches, and howitzers of 10-inch calibres, but they have a much greater quantity of metal in proportion to the length; and all my guns are intended to have a greater substance at the breech, with a slighter chase, as the bursting of cannon seldom or ever extends further than the trunnion, with the exception of the oval-bored guns, which are split at the muzzle through the imperfect rotation of the projectile. The late example of cannon on board the new class of American frigates has a much greater substance at the breech, on the same principle as I propose, since the bursting of the monster gun on board the *Princeton*, which killed the Secretary of the navy and several others; and, as I had been pressed to join that service by the intimate friends of the President and Secretary, with whom I was acquainted during my visit to the United States, it is more than probable that I should have been classed among the number who suffered, as my interest in the improvement of cannon would have induced me to attend the experiment.

I find that I have again extended my letter beyond the due limits of a professional journal; but I am sure, Gentlemen, you will pardon me, when you consider how strongly I feel interested in subjects calculated to sustain England's independence, and to protect her shores against successful invasion, for which my naval and military improvements were chiefly undertaken; and

I still hope Her Majesty's Minister at War, whose special duty it is to take cognizance of such improvements, will yet consider it right to see that such exertions as those to which I have called your attention are not disposed of to England's disadvantage.

I am, Gentlemen, yours, &c.,

JOHN POAD DRAKE.

London, Nov. 20, 1857.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Engineers recognise the superior simplicity of the English over the American gun, facetiously called by some, the "Ginger pop-gun," from its resemblance to a soda-water bottle. But the subject is grave. Is the patriotic offer of fifty years' study of an observing man—Mr. J. P. Drake—to be heedlessly passed over?

I have watched the correspondence, and, from deference to technical opinions, forbore to offer any further remarks; but when the scion of a race of gun-makers speaks so plainly as Mr. Holland does, and an Artillerist declares his conviction that the old muzzle-loading gun is more efficient than Lord Panmure's purchase, at the same time commending the English gun, I feel impelled to pronounce my individual sense of the Government supineness. Lord Panmure's was not a private speculation—public money procured the exotic; and there is no justifiable plea why public money should not bring a native plan to the touchstone of experiment. Where there is the will there is a way. "*Fiat justitia! ruat*"—*red tapeism!*

I am, Gentlemen, yours, &c.,

G. W. JACKSON, C.E.

Plymouth, Nov. 23, 1857.

THE IRON QUESTION.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I beg to inform Σιδηρος that I never complained that he had not sufficiently eulogised Mr. Bessemer; and had he not done so at all I should have been equally well satisfied. What I complained of was, that he should first shake that gentleman so warmly by the hand and smile so good-naturedly upon him, and immediately afterwards turn round and try to smite him. After commenting in very laudable terms upon the Bessemer process, he suddenly alters his tone, and, after stating that certain defects exist in the iron made by that process, says, "Therefore the Bessemer iron is not *commercially* valuable." If iron be not commercially valuable, in what other respect is it so? Is there any merit in showing that you can at great expense produce, with fluid iron and air, a grand pyrotechnic display? Assuredly not. The merit consists in obtaining commercial results by such a display.

Σιδηρος denies that he stated that Mr. Bessemer could not overcome the difficulties which beset the full development of his discovery. He surely will not deny that he stated that, though Mr. Bessemer "had made one stupendous step in advance of the whole metallurgical and scientific world, he nevertheless lost all credit, because he *was unable to take the second step towards complete success.*" What I maintain is, that he *has* taken the *second* step towards complete success, and that he is competent to take as many more steps as may be necessary.

I would also remind Σιδηρος that I have not spoken of any undisclosed processes, but only of those which Mr. Bessemer has patented and published to the world; and if Σιδηρος will take the trouble to examine these, he will discover that instead of Mr. Bessemer being "anticipated by R. Mushet," the reverse is the case. Should he not be able to discover this fact, "the astute Mr. Green" will have little difficulty in doing so, and of proving this assertion in the most incontrovertible manner. As, however, I do not wish to disparage the inventions of Mr. Mushet, but, on the contrary, would like to see so indefatigable and talented an inventor duly rewarded for any real merit which his inventions may possess, it is well not to do this at present.

I would also state that it is not necessary that the "purest descriptions of charcoal pig iron" should be used in the Bessemer process, in order to make good steel. Almost every description of iron, both foreign and English, has been tried, and good marketable steel *can* now be made from ordinary cast iron. This fact will soon be proved, on a sufficiently extensive scale, to satisfy the the most incredulous.

As regards the destruction of the impurities present in fluid cast iron by the Bessemer process, I would simply remark that it is much easier to say "bosh" than it is to disprove a fact. That phosphorus has been a tough antagonist is admitted, but that the means of overcoming it have not yet been discovered by Mr. Bessemer is another question.

I am, Gentlemen, yours, &c.,

WILLIAM GREEN.

Pembroke Cottages, Caledonian-road,
Nov. 30, 1857.

ROBERTS'S PATENT PUMPS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—When I stated in my last letter that the suctions of the pumps were 23 to 24 feet long, and the perpendicular lift 15 feet, I certainly did not expect to be asked if the two lengths were to be added together, especially by Enquirer, who evidently knows something of pumps. (Did Enquirer ever see a pump that would fetch water 39 feet in perpendicular height?) But as further information is wanted, and that of a very precise description, and as my present engagements will not allow me to get it for a few days at least, I would recommend Enquirer to carefully read again the article in No. 1787; by so doing he will find part of the information asked for there given, viz., the contents of the tanks, the number of men, number of revolutions, &c. He will also find that I claim for my pump several advantages over those now generally in use.

I am, Gentlemen, yours, &c.,
W. ROBERTS.

P.S.—The diagrams of the pump in No. 1787 are drawn to scale ¾ inch to the foot.

Millwall Cable Works, Nov. 30, 1857.

CIRCULAR STEAM TILLAGE.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I am obliged by your engraving my steam AGRIMOTIVE; the drawing looks rude, yet has a strong family likeness to that of the "first locomotive." You must live in the hope that you may possibly have recorded, in the pages of the *Mechanics' Magazine*, the outline of an implement which will one day lead to as great a revolution in the art of agriculture as the locomotive has in the art of transit. If introduced, I can with certainty affirm it will change the very face of the country.

Apart from the mechanical, I profess to have made a great discovery—that of providing a field for increased human employment, a field wherein "man" is of more value than machinery. In one art alone must mechanism be made subsidiary to the "man," and that is agriculture.

In my last letter I affirmed the following proposition, viz., that if men were directly assisted by mechanic power, they could execute all the labours of the field, at *a cheaper rate*, and *with a far greater ultimate result*, than is now obtained. In confirmation, I gave the outline of the machine through whose aid men could perform all those simple operations of the field, such as stirring the soil, sowing seeds, hoeing weeds, irrigating, &c. I beg to refer your readers to that number of the *Mechanics' Magazine* (No. 1787.)*

My steam-driven cultivator was invented expressly to develop the latent powers of the "man" as a field-machine and plant-rearer. It is a gallery, or trussed girder, some 84 feet in length. One end being fixed whilst the other is moved, it operates on the land in a series of circles, each circle described containing half an acre. Set to work upon a 10 or 20-acre field, or upon the whole farm, it of necessity divides it into parts or allotments. Now, by a fortunate coincidence, it happens that the "allotment system" is the most productive of all known systems of farming, since it has been proved, and is admitted on all hands, that if a 10-acre field be subdivided and let off into 20 parts, 10 times more produce will be drawn from that field than when the 20 allotments were operated upon as a whole.

So far, the system engendered by my Circular Steam Cultivator is good, both in theory and practice.

We now return to the "machine" which is to work out the "method." Taking for granted, in these days of large construction, that a platform, or trussed gallery 84 feet in length, can be made, which will contain the "works," and to which the tillage instruments can be attached, that which we have to consider is, the mechanical question of "How to make a steam engine cause one end of this platform to describe a circle, at the same time transmitting power laterally to the works within the machine, to be by them employed for the purposes of tillage, when requisite."

The "principle" upon which I propose to till land—unlike the present method of ploughing—is that of "repeated strokes," slight, but certain in effect. That is to say, if I desire to till half-an-acre of land, six inches deep, I should make three sweeps or revolutions over it, each stroke being only 2 inches deep.

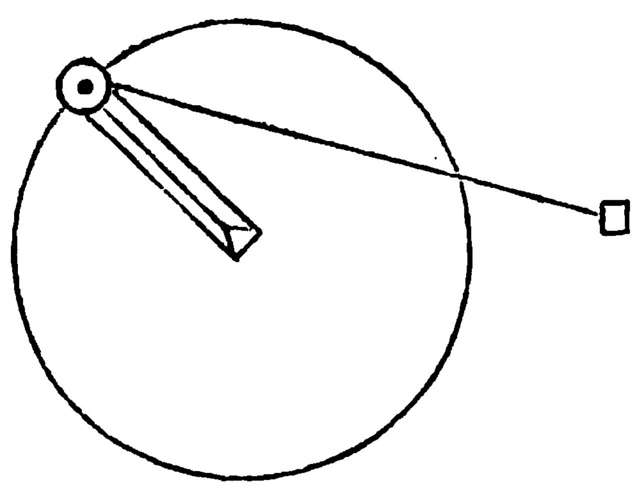
Now the question is, how to make a circular cultivator perform a revolution over half-an-acre of land by the power of steam? By the tractive power of horses, we know the cultivator could with certainty be made to describe a circle; but we desire first to reduce, and ultimately to get rid of the greater number of horses; so the grand question is, How to do it by steam?

We have half an acre of plane surface to till. In operating on a plane surface by a cutting tool, I ought to make a piston cause a horizontal fly-wheel (as we may consider

* The engravings in the letter alluded to should change places, the second coming first. — EDS. M. M.

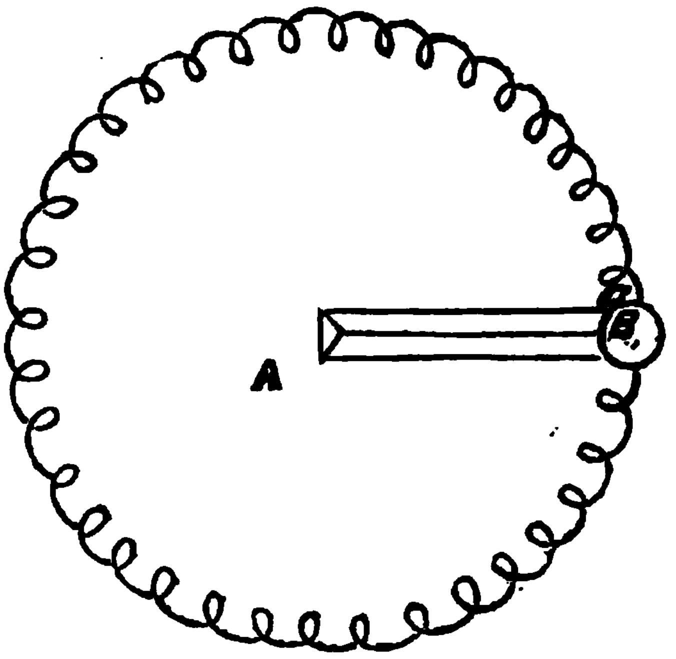
this) whose under surface was rasped or roughened at each stroke of the piston, perform a complete revolution over the half-acre plane surface, by which course of proceeding we should be able to abrade or grind up the soil, after the manner of the upper millstone in a mill. But every farmer will see that if a steam engine were placed outside one of these circles, with a piston attached to the extreme end of the machine —as in the engraving, fig. 1—the piston must be very long, and the "stroke" some 56 yards. Such power, by direct action, is

Fig. 1.



utterly beyond our engines or mechanism. Hence, what principle of mechanical action shall we adopt to attain our object? The same principle that we have inculcated as the true principle of operating in the field to till the soil, viz., that of working by repeated strokes, or by degrees. Therefore, instead of a long piston, with a long stroke, situate outside the circle, we should place a small steam engine stationary over the fulcrum, in the centre of the circle, which, by means of a piston or rod extending the whole length of the gallery, being a semi-diameter of the circle to within 12 or 15 inches of B, which space will be occupied by a crank communicating with a drum, around which is a wire rope, which wire rope

Fig. 2.



is distended or kept stretched all round the circumference of the circle, by means of either moveable or fixed fulcra or props, these props being maintained in an erect position against a strain upon them by a flange to each.

To make a circuit:—The engine at A actuates the rod, which rod will turn the crank at B, connected with the drum at C, around which latter the rope, distended by the fixed fulcra, is made to take a double turn. In this way it will follow that the tillage machine, by winding itself up on the rope, must make an entire circuit; and the mode by which it effects its passage will be represented by a series of small "loops" made on the circumference of the circle, as seen in the above diagram.

I am, Gentlemen, yours, &c.,

CHARLES BURCHAM.

8, Upper John-street,
Golden-square, W. C.

STRENGHTHENED CAST IRON GUNS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—"Observer" is glad to find, by Captain Blakely's letter, that the guns to which he called attention are not secret. They should not be, nor was the name of the inventor mentioned as a secret to me, as it was frankly given; but the unintentional mistake as to the position held by the inventor in the Arsenal is of no consequence, and the inquiry into the merits of the invention may still "lead to useful results."

Captain Blakely states important facts,—facts that cannot be too seriously reflected upon by scientific gentlemen who invent for the War Department of the State; and the "tax payers" may also profit by the astounding information which is not new to "Observer," although not generally known.

Let the Minister-at-war form the resolution at once to tell the tax-payers it is high time to give up the fallacy of taking up the time of officers "who have already more to do in their own department than they can fully manage," to get rid of inventions by inappropriate investigation, as some of them may be of more value to the tax-paying population than ten thousand times the amount of money it would require to get them fully investigated.

To sweep away the whole of 6,000 inventions in one year by "rejection," because "two minutes on an average" was all the time allowed for inspecting each invention,' is too grave a subject for the British tax-payers to sanction; nor would they, if made to comprehend the consequences rightly. It is not the expense of necessary investigation they complain of, but the want of it, which leads to the adoption of inventions not worth adopting; and if Lord Panmure,

as the head of this branch of the public service, will undertake to point out the ruinous results in due form, his lordship may calculate upon the co-operation of the unconscious "tax-payers" without opposition worth caring for from any quarter.

I am, Gentlemen, yours, &c.,

OBSERVER.

THE DRAINAGE OF LONDON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The *Mechanics' Magazine*, *Builder*, and other scientific publications, were so kind as favourably to notice my plan for the purification of the Thames. These notices have had the effect of inducing Mr. C. M. Archer to send to the above named publications a very foolish letter, which appears in your last number. He therein states that Mr. Lipscombe proposes to get rid of the sewage by *hydraulic power*; whereas he, Mr. Archer, proposed, in 1856, to get rid of it by means of *atmospheric power*; therefore Mr. Lipscombe's plan is an imitation of his. Queer reasoning this, but not more foolish than his scheme, which was unknown to me until after his letter appeared last week. A friend kindly pointed out to me a description of it in the *Building News*, dated Sept. 6th, 1856, and a few following numbers, on referring to which it will at once be seen that Mr. Archer's scheme is a very silly one, and, as might have been expected, elicited several sarcastic letters from correspondents. His ignorance of pneumatics prevented him from seeing that no vacuum could be formed in a tunnel tube whose terminal end was always open, and, were any portion of the tube between that end and his piston closed, the sewage could not flow at all; so that the beautiful system of atmospheric propulsion to which he alludes is mere moonshine; and how absurd to propose the formation of a railway in connection with a sewage tunnel! Mr. Archer evidently supposes that Londoners would form excursion parties for the express purpose of being regaled with sewage odours while travelling on his railway, and be rewarded on their arrival at his grand terminus by still stronger odours from the scented sea.

His statement that my *hydraulic* plan is an imitation of his *atmospheric* system, is simply an additional exhibition of folly on his part.

I am, Gentlemen, yours, &c.,

FREDERICK LIPSCOMBE.

AN IMPROVED SONOMETER.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—This, as the name indicates, is an instrument for ascertaining the intensity of sound, and will, I think, be found well adapted for that purpose. The construction, which is tolerably simple, and free from any delicate parts, is as follows: —A fan, like that of a clock, must be vertically fixed upon a stand, so that it can be caused to rotate by an ordinary cog-wheel arrangement. When in motion, a humming noise will be produced, varying in intensity according to the velocity of rotation, and in tone, of course, according to the size of the fan. Now, a horizontal crossbar must be fastened to the spindle supporting the fan, at each end of which must be springs to be pressed upon by small weights sliding on the bar. This would act as a governor, and, as the velocity of the spindle would be considerable, would be better than the ordinary governor; the weights should now be connected by means of two levers, which should tend to form a straight line upon the furtherance of the weights consequent upon the rotation of the fan, which levers should, by means of a thread passing over a small cylinder, or some such contrivance, work an index, and thus determine that which is required. J. A. D.

ALARM BELLS AT SEA.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I think it would be of great use in preventing shipwrecks if bells were fastened to sunken rocks or buoys, so as in either case to warn the mariner of his danger. In the former, a buoy could work the clapper by attaching the same to something acting as a fulcrum, or in the usual way. In foggy weather these would of course be especially serviceable.

J. A. D.

[If our correspondent considers this suggestion novel, he should read Southey's "Bell of the Inchcape Rock."—EDS. M.M.]

SPECIFICATIONS OF PATENTS RECENTLY FILED.

BRIDGES, H. *Improvements in buffing, bearing, and draw springs, and buffer cases for railway purposes.* Dated Mar. 14, 1857. (No. 729.)

This mainly consists in placing in a frame layers of vulcanised india-rubber separated by dividing plates or blocks of metal or wood, having recesses on one or

both sides to receive the india-rubber contiguous thereto, and such recesses having one or more projecting pins to pass through holes in the layers of india-rubber, to preserve them in the required position in the frame or case.

OATES, J. P. *Improvements in machinery for the manufacture of bricks, tiles, pipes, and other articles, made of plastic materials.* Dated Mar. 14, 1857. (No. 730.)

This invention cannot be described without engravings.

NUNN, M. *Certain improvements in machinery or apparatus for washing or cleansing clothes, piece-goods, and other articles.* Dated Mar. 14, 1857. (No. 731.)

This consists in so constructing and working an open wheel or drum containing detachable chambers for containing the articles to be washed, that the ley in which the drum revolves passes freely through openings in such chambers, and by its scouring action rapidly produces the cleansing effect desired.

BRADLEY, H., and E. WRAY. *Improvements in beaters used in thrashing machines.* Dated Mar. 14, 1857. (No. 732.)

The patentees take any number of strips of iron, &c., with channels crossing diagonally on their faces, so as to form an irregular diamond-shaped surface, and they fix these on the ordinary wooden beaters.

MARSHALL, G. *An improved saw setting apparatus.* Dated Mar. 16, 1857. (No. 734.)

This apparatus is constructed with a fence and spring, or with a lever to answer the same purpose. The fence has screws to move it backwards and forwards, or to secure it when adjusted to suit the setting of saws, and has also a rest for the saw plate.

THOMSON, J. *Improvements in mowing and reaping machines.* (A communication.) Dated Mar. 16, 1857. (No. 736.)

In this improved machine, circular cutters act against a series of pointed flat-bladed cutters or knives, arranged in two rows beneath the circular cutters. The fixed knives are slotted horizontally to allow the circular cutters to vibrate through them, and these parts of the machine are so arranged that all the grain or grass presented to the machine shall be subjected to the cutting operation, and none of it pass uncut to choke or clog it up. The machine is driven by a team of horses attached to the pole of the driving wheels; they are guided by a driver, sitting on a seat on the platform, by which the machine is attached to the axle of the driving wheel.

GLAYSHER, H. *Improvements in steam engine boiler and other furnaces.* Dated Mar. 16, 1857. (No. 737.)

The patentee provides a front and a back set of fire-bars, with an intermediate space, having a valve operated by a lever to open or close the same, and when raised it acts as a damper, causing the current of the draught from the front fire-place to descend and take a course upwards through the bars, and thence over the fire-bridge. Within the ash-pit is a moveable vertical screen, to act on the admission of air to the under surface of the grate bars.

MARTIN, H. *Improvements in apparatus for the supply of water to steam boilers.* Dated Mar. 16, 1857. (No. 738.)

Two valves on the same spindle cover two openings, one at the top and the other at the bottom of a chamber in connection with the supply-pipe. Below the chamber is fixed a pipe which descends into the boiler to near the bottom. Above the upper valve is another chamber, closed by a cover, through which the spindle of the valves passes, and is connected to a lever near its fulcrum. At one end of the lever a wire is attached, having a float affixed thereto, and at the lower end is attached a wire with a balance weight, descending to the water in the boiler. The chambers below and above the valves are connected by a water-way. The apparatus is placed within a steam-tight casing, fixed to the top of the boiler.

MOES, J. *Improvements in warming and ventilating.* Dated Mar. 16, 1857. (No. 740.)

The different parts of houses, ships, &c., are connected to two pipes, one of which is employed for withdrawing the vitiated air, the other for admitting fresh air, a fan being employed to act on the air.

AMIES, N. J. *Certain improvements in machinery or apparatus for polishing and finishing yarns or threads.* Dated Mar. 17, 1857. (No. 743.)

The object here is dividing the yarns or threads so as to prevent their rubbing against or overlaying each other during the process of polishing and finishing. This is attained by passing the yarn, &c., in one continuous length around the ordinary distending rollers, and between the divisions formed by a series of eyes, pins, healds, or reeds; motion being imparted to the rollers, the yarn becomes worked off them and delivered at one end of them on to bobbins; thus each single thread passes in one continuous length along the rollers, and is "finished" or polished as it progresses towards the bobbins.

ASKEW, C. and J., and H. MYERS. *Improvements in hydraulic and refrigerating apparatus for the purpose of raising sunken vessels, anchors, and all other submerged bodies, with light and other certain apparatus used for the same purposes.* Dated Mar. 17, 1857. (No. 744.)

This consists in a mode of arranging hydraulic lifts, which, with air pumps, are fixed to the vessel to be raised; screw clutches are attached to the vessel in such manner as to be acted on by the hydraulic piston lever rods. A raft is brought alongside the vessel, and to it are connected a signal bell and whistle, a light and safety cage which are fitted with piping to convey signals to the surface of the water. The air pumps are surrounded with refrigerators to keep them cool, and they supply air to the diver's cage.

REMFRY, G. F. *A portable apparatus for working punkas and whisks.* Dated Mar. 17, 1857. (No. 746.)

This consists of an arrangement of wheels, levers, &c., driven from a primary wheel by a weight or spring.

KNOWLES, Sir F. C. *Improvements in the manufacture of cast steel.* Dated Mar. 17, 1857. (No. 747.)

This invention is described at page 535 of this Number.

NEWTON, W. E. *Certain improvements in folding window blinds and shutters.* (A communication.) Dated Mar. 17, 1857. (No. 749.)

This invention cannot be described without engravings.

NEWTON, W. E. *Certain improvements in artificial legs.* (A communication.) Dated Mar. 17, 1857. (No. 750.)

This consists in the employment of elastic cords connecting the thigh with the foot, for the purpose of controlling the movements of the several parts of the limb. Also in the application to the socket of the thigh of a sack, which is made to fit the stump of the natural limb, and suspended at its mouth from the edge of the socket of the artificial one, for the purpose of relieving the stump from pain.

ANQUETIN, M. *An improved traveller's watch.* Dated Mar. 17, 1857. (No. 751.)

This consists in a method of causing a clock or watch to indicate in hours and minutes two different hours corresponding to the times at two different places at the same time.

MACNAUGHT, W. *Certain improvements in engines worked by steam or other motive power, and in their gearing for connecting them with machinery, and in the means of lubricating such engines.* Dated Mar. 17, 1857. (No. 753.)

This is an elaborate invention, comprising improvements in the working of air-pumps, in parallel motions, in air-pumps, in air-pump buckets, in toothed-wheels, in lubricating piston-valves, and in S. Fielding's patent for lubricating steam-engine pistons.

M'CULLOCH, W., and J. KENNEDY. *Improvements in stop-cocks or valves.* Dated Mar. 17, 1857. (No. 754.)

The improved stop-cocks or valves cannot well be described without engravings.

FORSYTH, G. *Improvements in steam cooking apparatus.* Dated Mar. 17, 1857. (No. 755.)

The object here is to raise steam in a boiler, and convey it by pipes to an inner vessel in which the food intended to be prepared is placed. A pressure of steam, of about two pounds on each square inch, is sufficient to carry out the process.

MILLAR, J. *Improvements in stoppers or closing apparatus for decanters, bottles, and other receptacles.* Dated Mar. 18, 1857. (No. 757.)

This consists of various contrivances by which the stoppers of decanters, &c., are attached to them, swinging open when the decanters are inclined, and closing when they are upright.

YARROW, T. *Improvements in locomotive steam engines.* Dated Mar. 18, 1857. (No. 758.)

This relates to engines in which coal alone can be used in locomotives. It consists of a modified form of furnace, and of a mode of admitting air to increase the draught, thereby causing the smoke to be consumed, &c.

MURDOCH, J. *An improved process for imitating the skins of animals upon fulled cloth.* (A communication.) Dated Mar. 18, 1857. (No. 761.)

This consists principally in printing fulled fabrics before they are dressed or carded, for the purpose of smoothing the surface of the stuff as it leaves the fulling mill, then in beating by means of rods the printed stuff in a moist state to raise the nap, which is then shorn in this state, either slightly or more deeply, as required.

WILKES, J., T. and G. *A new or improved manufacture of rollers or cylinders for printing fabrics.* Dated Mar. 18, 1857. (No. 763.)

This consists in manufacturing cylinders by drawing a hollow cylinder or tube of copper upon a hollow cylinder or tube of cast iron.

LEWIS, J. *Improvements in machinery or apparatus for reaping and mowing.* Dated Mar. 18, 1857. (No. 768.)

This consists of an endless band of steel as a cutter for reaping and mowing. This belt passes over a series of pulleys, motion being communicated by a tram-wheel. The belt knives may be serrated like a sickle, toothed like a saw, or corrugated very finely across the whole breadth, so that, when sharpened, an edge similar to that of the sickle would be produced. This cutter is adapted to the ordinary machine.

CAMPBELL, S. *Improvements in preserving vegetable substances.* Dated Mar. 19, 1857. (No 771.)

For preserving potatoes they are first washed and peeled, pierced all over, and placed in salt and water for thirty minutes. They are next put into a copper with pearl barley, say one quart of barley to ten gallons of water, and left to simmer. After about twenty minutes they are taken out and allowed to cool, when they are broken into small particles, and dried by exposure to a temperature of 110° Fahr. They are then ready for packing. For preserving carrots, onions, cabbages, cauliflowers, turnips, beans, peas, &c., the inventor uses a solution of gum arabic and carbonate of soda.

MELLIER, M. A. C. *Improvements in desiccating or drying paper and other goods in process of manufacture.* Dated Mar. 19, 1857. (No. 774.)

This consists in exposing such goods in a chamber to the action of a charge or current of air produced by a shaft. The air so admitted to the chamber may or may not be previously heated.

MERRETT, W. G. *An improvement in coats and waistcoats.* Dated Mar. 19, 1857. (No. 775.)

This consists in forming those parts of coats and waistcoats which come under the arms, of a flexible material, perforated with numerous small holes, in order to ventilate under the arms.

ADSHEAD, J. S., and A. HOLDEN. *Certain improvements in machinery for carding cotton and other fibrous materials.* Dated Mar. 20, 1857. (No. 776.)

This consists in stripping a series of working rollers by means of vibrating combs, actuated simultaneously.

MAIRE, J. F. *An improved cooking apparatus, producing a saving of fuel and time.* Dated Mar. 20, 1857. (No. 778.)

This consists in putting the food to be prepared for eating with water in a cooking vessel of the digester kind. The water in this vessel is raised as high as two atmospheres pressure, which is shown by a valve on the lid. At the moment the valve begins to rise, and the steam escapes, the vessel is taken from the fire and completely wrapped up with materials that will not suffer the heat to escape. The caloric that has been produced when the vessel was upon the fire is thus concentrated in the vessel tightly shut up, and the cooking completed away from the fire.

HALL, H. *An addition to "throstles" for doffing the bobbins.* Dated Mar. 20, 1857. (No. 779.)

Several contrivances for effecting the above purpose are here described.

WEISS, C., and H. LISTER. *Improvements in the means, machinery, or apparatus employed in the finishing of mohair and other textile fabrics.* Dated Mar. 20, 1857. (No. 781.)

This relates to machinery for producing the "whirlpool finish" on textile fabrics, and consists in the use of a board or table, in which are fixed pins at intervals; also another board of similar dimensions, with circular pieces of wire card or cluster of points corresponding in positions with the points before mentioned, and so that when the two boards are one over the other, with the fabric between them, and motion is given to the one with the wire cards thereon in the manner of "frizing boards," by cranks, eccentrics, or tappets, the nap of the fabric will be laid around the points in numerous lines according to the number of points in a cluster, eccentric to the centre of the pattern which is produced around each point.

WEISS, C., H. LISTER, and J. MITCHELL. *Improvements in finishing woollen and other textile fabrics, and in the machinery or apparatus employed for that purpose.* Dated Mar. 20, 1857. (No. 782.)

The patentees perforate a sheet of thin metal plate, and apply it to the smooth face of the fabric, and by the alternate use of a damp and a dry brush work up the nap through the perforations, making those portions of the surface rough which, on removing the plates, contrast with the smooth parts of the surface. They also form cylinders (capable of rotating) of such perforated plates over which the fabrics pass, and by means of rotating damp and dry brushes within the cylinder the surface of the fabric is operated upon through the perforations.

PARKER, J. *Improvements in apparatuses for separating corn and other grain and seeds from dust, chaff, and other matters.* Dated Mar. 20, 1857. (No. 783.)

This consists in combining a screen blower and separator in one machine. The seed to be cleaned falls from a hopper, in the bottom of which there is a slide to regulate the supply; a blower is so placed that, as the seed falls from the hopper, the dust is blown out of the machine on to the floor; the inferior corn is blown against a board fitted in slots on each side of the machine, and falls down into a spout thence to the floor; the best corn drops on to an endless flannel belt, and is carried to a screen down which it falls into a receptacle; the dust or "herriff" sticks to the flannel, and being carried against a scraper, is scraped off into a drawer.

GREENWOOD, N. J. *Improvements in spinning mules and slubbing machines.* Dated Mar. 20, 1857. (No. 784.)

This consists in the application to such machines of an additional draft motion for drawing the wool, &c., to a proper thickness. This motion is obtained by aid of different sized pinions which may be thrown into gear when desired; the parts may be so regulated as to give a quicker or slower draft.

JOURDA, J. P. *Raising sunken vessels.* Dated Mar. 20, 1857. (No. 785.)

The patentee uses apparatus by which he attaches floats to a sunken vessel, and inflates them after they are attached, and yet is able to disengage the whole with facility.

CHEDGEY, J. *Improvements in machinery for mangling, calendering, or pressing goods.* Dated Mar. 20, 1857. (No. 786.)

This relates to the adaptation to mangles, and other pressing machines, of polished glass for the pressing or friction surfaces, in place of metal or hard wood, the object being to effect the glazing of woven and other goods.

SAYER, G. W. *Improved machinery for stopping or retarding railway carriages.* Dated Mar. 20, 1857. (No. 787.)

This relates to a previous patent, dated Sept. 20, 1856, and consists in adjusting the brake blocks, so that when a number of carriages are connected together all the brake-blocks may be in proper adjustment. This adjustment is effected by making the horizontal arms which carry the brake-blocks, as shown in the specification of the former patent, adjustable on the central longitudinal brake-shaft, instead of such blocks being separately adjusted as therein described. Other modifications are included.

ATKIN, I., and M. MILLER. *Improvements in dividing lace.* Dated Mar. 20, 1857. (No. 788.)

The lace to be divided is wound on a roller, and it is divided into the different breadths whilst being wound from this roller on to another roller, by means of cutters intermediate of the two rollers. Each cutter is formed of wire, one end of the wire being turned round over a bar, so as to allow the wire to move freely; the other end being bent down and sharpened, so as to form the cutting or dividing edge.

JOHNSON, W. *Improvements in steam boilers and furnaces, and in apparatus connected therewith.* (Partly a communication.) Dated Mar. 20, 1857. (No. 789.)

This relates—1. To the boilers of locomotives, &c., and it is intended to make the top of the fire-box concave, or curved inwards towards the fire. 2. To the arrangement of furnaces, particularly suited for locomotive engines burning coal. The fire bars are disposed in the fire box with a very considerable slope downwards from the fire door. The coal is fed into the furnace by a vibrating or moving hopper at the fire door. This hopper is contrived so as to be capable of feeding in the coal across the entire breadth of the furnace bars, &c.

SEATON, W. *Improvements in the construction of the permanent way of railways, and in the machinery or apparatus employed therein.* Dated Mar. 21, 1857. (No. 790.)

Here, it is first proposed to use longitudinal sleepers of rough baulks of timber of a rectangular, semi-circular, or other section. These baulks are dressed or faced on their upper surface so as to receive the flanges of the rail to be adapted thereto, the shaping or dressing of the sleeper being effected by means of rotary cutters. It is also proposed to interpose felt, &c., between the bearing of the rail and the sleeper for lessening the noise produced by the transit of the trains, and also for causing less vibratory motion. The improved forms of rails included under the second head of this invention consist, according to one modification, in making the flange of the rail of a perfectly rectangular form. Another improved form of rail consists of the ordinary bridge rail, or the common girder rail, constructed with rounded or concave flanges to suit the rounded or flattened form of the timber sleeper.

MOXON, W., J. CLAYTON, and S. FEARNLEY. *Certain improvements in looms for weaving, which said improvements are particularly applicable to looms for weaving carpets and other looped or piled fabrics.* Dated Mar. 21, 1857. (No. 791.)

This ralates—1. To machinery designed to insert and withdraw the wires (either fixed or loose) from the loops of the fabric. The apparatus consists in a grooved cam which, by means of a lever, chain, or rack, actuates certain arms which move a carriage along a slide, the carriage being provided with apparatus for holding the wires, thereby inserting or withdrawing the wires as the carriage moves backwards or forwards. 2. In a method of imparting motion to the slay, by cranks and arms so arranged as to "beat up" one or more times at one revolution of the crank, and also in so arranging the action of the slay as to cause a dwell during the passage of the shuttle. 3. To certain machinery for governing or regulating the motion of the warp beam, in order to "let off" the warps therefrom in an uniform or regular manner. 4. To lifting the jacks by a direct upward action, in order to prevent or lessen the strain exerted upon the healds, this portion of the invention being also applicable to all such looms wherein healds are lifted by "jacks."

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

MACDONALD, R. *Improvements in sewing or embroidering textile fabrics.* (Partly a communication.) Dated Mar. 14, 1857. (No. 728.)

This relates to a mode of embroidering fabrics particularly applicable in the manufacture of sewed muslins. The embroiderer first makes whatever stitches may be necessary in the body of the muslin, and then in working the figure upon the surface, the embroidering needle being entered into the fabric, and having its point uncovered, the thread is passed round the front projecting end of the needle, so as partially to cover it. The sewer now draws the needle out, and this action causes the coils of thread to slide off the needle, and become retained in a solid mass upon the uncoiled part of the thread, the coils being in fact transferred from the needle to the thread.

BOWDEN, T. *Improvements in apparatus for discharging the water resulting from the condensing of steam used in apparatus heated by steam.* Dated Mar. 16, 1857. (No. 733.)

A chamber is formed, having within it a diaphragm with two openings to which valves carried by a lever are applied, one at each end of the lever; the fulcrum being intermediate of the valves. The stem of one valve has on it a hollow float, and to the lower end of the stem is attached another valve for closing the outlet from the chamber, such valve being pressed upwards by a spring with a tendency to open it. When steam is admitted to one side of the diaphragm, it opens one of the valves and presses the other valve, which is connected to the same stem into its seat so as to close the outlet passage. When an accumulation of water raises the float, it will raise the outlet valve, and also the valve connected with its stem, the water will flow out at the outlet, and the valve at the other end of the lever will be opened till the water allows the float to descend.

HALL, G. J. *An improvement in finishing fabrics made wholly or partly of silk.* Dated Mar. 16, 1857. (No. 739.)

The fabrics are wound on rollers, which are placed between a bed and a pressing box, which is moved to and fro, and the improvement consists in applying heat to the bed, or to the under surface of the box, or to both.

BROOMAN, R. A. *Improvements in zincing or coating metals with zinc, and in cleaning metals.* (A communication.) Dated May 16, 1857. (No. 741.)

The following are the different methods of carrying this invention into effect:—1. The iron, being cleaned, is rubbed with amalgam of zinc in powder, which has been digested in hydrochloric acid with an excess of ammonia in the state of salt or of liquid. 2. The same combination as the first is used; but instead of taking a pure amalgam of zinc, the inventor uses zinc in powder, and a salt of mercury dissolved in hydrochloric acid. 3. The solution here used is composed of zinc in powder, and of ammoniacal salt in excess in chloride of zinc with excess of acid. Here the zinc does not dissolve, but remains in a state of small particles, and after being digested for some time in this solution, it adheres to the iron by friction. The iron is plunged in this solution. 4. Chloride of zinc and amalgam are used. 5. The same solution heated, with the addition of ammoniacal salt, is used. The invention also consists in the employment of mercury for cleaning iron: thus, for example, in a bath of muriatic or sulphuric acid, a small quantity of mercury is to be added, and a dose of ammonia.

BROOMAN, R. A. *Improvements in apparatuses for splitting leather, in order to manufacture tubes, sheaths, and other articles.* (A communication.) Dated Mar. 17, 1857. (No. 742.)

These apparatuses consist of a pair of cylinders, through which the leather is passed, and presented to a knife working horizontally, mounted in a knife holder, hollow throughout its length. By means of a lever handle the holder performs a to and fro motion in front of the rolls, moving upon a fixed centre. In order to insure the knife dividing the skin exactly in the centre, the knife holder is fitted in supports, which are capable of adjustment by screws, while an upright rod connected to the back end of a rod working inside the hollow holder communicates with a pointer, which indicates upon a fixed scale any departure from the horizontal line in which it ought to travel.

PALMER, H. B. *An improved fire-lighter.* Dated Mar. 10, 1857. (No. 745.)

This consists in combining coal, sawdust, oak bark, resin, and oil, the whole being pulverized and mechanically mixed, so as to introduce into the compound when in a plastic state the fibre of cocoa-nut or hemp, for causing the materials when moulded to adhere firmly together.

DEAN, T. *Improvements in looms.* Dated Mar. 17, 1857. (No. 748.)

To ease the concussion of the shuttle the inventor attaches to the back of the stop-rod finger a spring with a bolt projecting through a slot, so that the shuttle or swell presses against it. And to relieve the concussion of the picker in the shuttle box he fixes a spring under the slay, and attaches the short check strap to the same. The

governing and yielding power of the spring keeping the picker in check, prevents severe concussion.

WITHNALL, J. *Certain improvements in the manufacture of rollers or cylinders to be employed for printing calico and other surfaces.* Dated Mar. 17, 1857. (No. 752.)

This relates to the use of malleable iron, in contradistinction to the use of ordinary cast iron, as heretofore employed in the manufacture of such printing rollers as are composed of the two cylinders combined, the one within the other.

FOX, J. *An improved music-scale.* Dated Mar. 17, 1857. (No. 756.)

This consists in placing a quantity of additional musical sounds in certain positions within the present octave.

GREEN, J. *Improvements in gas-consuming furnaces, and in the automatic action of the controlling valves or dampers of the said furnaces.* Dated Mar. 18, 1857. (No. 759.)

This consists in so regulating the entrance of a blast in furnaces of steam boilers, that the quantity of hot and cold air thrown into the fire-space, or under the grate, may be self-regulating, by means of a damper placed at the mouth of the stack.

LOUBATIERES, F. B. *Improvements in the manufacture of paper, card-board, and pasteboard.* Dated Mar. 18, 1857. (No. 760.)

This consists in manufacturing paper, &c., of alternate layers of paper pulp and tissue, so as to form one solid body.

TALBOT, R. *Improvements in furnaces used in the manufacture of iron.* Dated Mar. 18, 1857. (No. 762.)

Here the fire-place is situated nearly opposite to the opening at which the workman effects the puddling, while the opening at which the cinder passes out is situated on one side of the furnace. The inventor combines the annealing and finishing furnaces in one.

HOPE, L. *Improvements in the manufacture of paper.* (A communication.) Dated Mar. 18, 1857. (No. 764.)

This consists in applying the inner bark of birch and maple trees in such manufacture.

ANDERSON, Sir J. C. *Improvements in locomotive and other carriages.* Dated Mar. 18, 1857. (No. 765.)

This consists—1. In fixing, horizontally and longitudinally. on the top of a tubular locomotive boiler, a cylinder, united to the boiler by vertical pipes, and used as a steam chamber. By this arrangement the tube cylinder and fire box can be kept almost full of water, which will secure the tubes and the top of the fire box from being left uncovered with water on ascending or descending hills. 2. The wheels of locomotive engines for common roads or for ploughing, carriages, omnibuses, &c., are to be placed within other wheels of larger diameter, so arranged that each wheel will run on the concave surface of a larger wheel which is to form its railroad.

TAYLOR, J. H. *Improvements in buckets and valve seats for bilge and other pumps.* Dated Mar. 18, 1857. (No. 766.)

The inventor forms the valve seat either of vulcanite or of hardened rubber, &c., and with a knife or sharp edge for the spherical valve to rest upon. Grooves are also formed round the outside of the bucket, and packed with vulcanized rubber.

JOHNSON, R. *Improvements in cleaning iron and other metals, after the manner known as pickling.* Dated Mar. 18, 1857. (No. 767.)

The inventor excludes the materials from the access of atmospheric air during the process of pickling.

WILLIAMS, J. *Improvements in cocks or taps.* Dated Mar. 19, 1857. (No. 769.)

The inventor constructs this cock by having a vent tube passing through the horizontal part, one end of this being open to the vessel, and the other end communicating with the atmosphere by a passage through the "tumbler" or plug, in which passage a ball valve is provided to prevent the liquid flowing out through this passage, whilst it admits of the air passing into the vessel. No vent-hole and peg is required in the cask when this tap is used.

ARMISTEAD, H. *An improved "picker" to be used in power looms for weaving.* Dated Mar. 19, 1857. (No. 770.)

This consists principally in so forming the picker that motion may be imparted to it at a point between the situation of the guide spindle and the part of the picker by which the shuttle is struck. This principle is applied in a picker which works in an upright position, but moving in a horizontal direction, as usual, and consists of an outer metallic tube or frame, the interior of which is filled with a yielding substance.

BROOMAN, R. A. *An improved projectile.* (A communication.) Dated Mar. 19, 1857. (No. 772.)

The object here is to produce a projectile which will not only prove destructive by the force with which it strikes any animal or object, but will be further destructive by bursting after having entered the object. It consists of a copper cylinder encased at the lower part in lead; a conical copper top is screwed on to the cylinder, and in the centre of the cone is an aperture for the reception of a shaft, which rests at bottom upon a metal bar inserted in the upper part of the cylinder; a pin prevents this rod falling out of the projectile; on the top of the rod,

and projecting slightly from the conical top, is a conical disc. Before using the projectile a percussion cap is placed on the bottom end of the rod, and the cylinder is filled with gunpowder.

REID, W. *Improvements in safety-apparatus for guarding the mouths of pits, excavations, and other openings.* Dated Mar. 19, 1857. (No. 773.)

As applied to a coal-pit mouth, this apparatus consists of an open rectangular timber frame, large enough to embrace the opening at the head of the shaft. This frame has its two ends hinged on. When the cage is down the shaft this guard frame stands upon the pit mouth; but when the cage is wound upwards, projections upon the cage come in contact with the feet of the frame, and lift it up clear of the pit's mouth.

NINCK, J. *Improvements in placing sets or partial sets of teeth, gums, and palates on plates.* Dated Mar. 20, 1857. (No. 777.)

The plates are composed of gutta percha, India-rubber, sulphate of zinc, vermilion, and proto-oxide of gold, in such proportions that the heat renders the amalgamation both hard and elastic.

GRIPPER, E. *Improvements in the treatment of the fruit or vegetable "algorabas," and in the application of the same as food for cattle.* Dated Mar. 20, 1857. (No. 780.)

The inventor steeps the algorabas or locust bean in hot water, and thus increases the quantity of saccharine matter. After the beans are steeped he crushes them, and afterwards presses the pulp to remove a portion of the saccharine syrup. He subjects the residual pulp to the heat and pressure of steam, so as to form a cake for feeding cattle.

LAWRENCE, T. *Certain improvements in steam engines.* Dated Mar. 21, 1857. (No. 792.)

This relates to such steam engines as are so constructed that the steam, after acting on a high-pressure piston, passes through apertures into a low-pressure engine, and then on to the condenser, and consists in the introduction of certain valves to the apertures leading from the high-pressure cylinder to the condensing engine, for the purpose of cutting off the communication between the high and low-pressure cylinders, and communicating the high-pressure cylinder with the condenser at any part of the stroke, and creating a vacuum on both sides of the high-pressure piston alternately, thereby increasing the power of the same.

PROVISIONAL PROTECTIONS.

Dated July 27, 1857.

2044. Frederick Bonaparte Anderson, of High-street, Gravesend, spectacle manufacturer. A mechanical slow match for submarine or other blasting and mining operations.

Dated August 15, 1857.

2174. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in the preparation of dough for bread, pastry, cake, and other farinaceous articles of food. A communication from J. Perry and E. Fitzgerald, of New York.

Dated October 20, 1857.

2684. Charles Tooth and William Watkin Wynne, of Burton-on-Trent, brewers. An improved refrigerator or apparatus for cooling or attempering liquids.

Dated October 23, 1857.

2704. William Henry Hine Akerman, of Bridgewater, Somerset. Improvements in organs and similar musical instruments.

Dated October 26, 1857.

2712. Isaac Jones, of St. Helens, Lancaster, glass flattener. Improvements in the manufacture of sheet glass.

2714. John Horrocks, of Manchester, machine maker. Improvements in winding machines, and in the bobbins employed therein, and also improvements in shuttles for weaving with such bobbins.

2716. James Ferrabee, of Phœnix Iron Works, Stroud, engineer, and Charles Whitmore, of Stroud, mechanic. Improvements applicable to machinery for carding, scribbling, and condensing wool and other fibrous substances.

Dated October 27, 1857.

2718. William Clarke, of Laybourne-road, Camden Town, railway guard. Improved means of connecting and working breaks for railway carriages.

2720. Thomas Mottram, manufacturer, of Sheffield. Improvements in knife handles.

2722. Robert Alexander Margetson, of Norwich, stonemason. Improved means of communicating between the guard and driver on railways.

2724. Robert Urie, of Paisley, and William Sutherland, of Greenock. Improvements in the manufacture of knitted and weft-netted warp fabrics.

Dated October 28, 1857.

2726. Henry John Daniell, of Donington-park, Derby, Colonel (late) Coldstream Guards. Improvements in communicating by signals between the pilot and steersman, and between other parts of vessels by means of dial apparatuses.

2728. Johan Ernst Fridrich Luedeke, of Birmingham, mechanical engineer. A new or improved motive power engine.

2730. Pierre Adolphe Melchior Maury, of Paris, merchant. Improvements in cutting the pile of velvets and other pile fabrics.

2732. Aimé Bourgeois, of New Oxford-street. An improvement in preparing liquor for tanning hides and skins. Partly a communication.

2734. Joseph Sloper, of Oxford-street, builder. Improved means of, and apparatus for, obtaining motive power for propelling ships or driving machinery.

2736. William Clark, of Chancery-lane. Improvements in the manufacture of murexide. A communication.

2738. William Edward Newton, of Chancery-lane. Improvements in the manufacture of sewing silk, twist, and different kinds of thread. A communication.

2740. John Child, and Joseph Child, of Birmingham, gun manufacturer. A double barrelled gun with an elevated rifled tubular rib.

2742. John Fraser, of Glasgow, manufacturing chemist. Improvements in the manufacture of saltpetre.

2744. William Greening, of Lower Edmonton, civil engineer. Improvements in enamelling and ornamenting metals and other surfaces.

Dated October 29, 1857.

2746. Daniel de la Cherois Gourley, of Wilton-house, Regent's-park. Improvements in ambulance carriages.

2748. Thomas Cook, of Old Kent-road, machinist. Improvements in machinery for cutting, framing, and packing lucifer and other like wood matches.

2750. William Padgett, of Poole. The manufacture of earthenware pipes for drains and sewers.

2752. Ephraim Smith, of Carlisle-street, goldsmith. An improved safety hook or fastening, particularly applicable to securing watch chains and watches to waistcoats and other garments.

Dated October 30, 1857.

2754. John Evans, of Lower-road, Islington, designer. Certain improvements in the method or methods of affixing or securing patterns and designs upon rollers and blocks used for imprinting on paper and other substances.

2756. Henry Charlesworth, of Huddersfield, cardmaker, and William Chapman, of the same place, machine maker. Improvements in machinery or apparatus for preparing woollen or other fibrous substances to be spun.

2758. William Shields, of Salford, engineer. Improvements in machinery or apparatus for etching, engraving, and cutting cylinders and other surfaces, to be used in printing and embossing.

2760. Joseph Davy, of Bradford, York, machine maker, and William Bentley, also of Bradford. Certain improvements in looms for weaving.

2762. Thomas Symes Prideaux, of Charing-cross, engineer. Improvements in apparatus for regulating the supply of air to furnaces.

2764. Malcolm Stodart, of Golden-square. An improvement in the construction of the sound boards of pianofortes.

Dated October 31, 1857.

2766. Henry Jean Viault and Jules Viault, of Paris. An apparatus or mechanism for making signals on railways, and preventing collisions on the same.

2768. Thomas Lowe, of Birmingham, manufacturer. A new or improved method of feeding screws, blanks, shanks, pins, and other such like articles, to turning, nicking, and worming lathes or machines.

2770. Leon de Landfort, of Higher Broughton, near Manchester, gentleman. An apparatus for protecting the contents of pockets of wearing apparel from theft and loss.

2774. Peter Gabbitass, of Worksop, Nottingham, machine maker. Improvements in washing machines.

2776. Joseph Fry, of Watling-street. An improvement in cementing fabrics when India-rubber is employed.

2778. James Lee Norton, of Bow, and Edwin Wilkinson, of Leeds. An improvement in extracting oil and grease from wool previous to its being manufactured into yarn or fabrics, and also when in the state of yarn or fabrics, and in scouring or cleansing such wool, yarn, and fabrics.

Dated November 3, 1857.

2787. Stanislas Hoga, of Charlotte-street, Fitzroy-square. Improvements in electric telegraphs.

Dated November 11, 1857.

2845. Peter Madden, of Dublin, architect. Improvements in kilns for drying corn, malt, or other granular substances, part of these improvements being applicable to the screening or sifting of such substances during the process of drying.

2847. Otto William Wahl, of Leadenhall-street. Improvements in manufacturing farinaceous products from potatoes. A communication.

2851. Joshua Williams, of Neath, Glamorgan, engineer. An improvement in coupling and connecting carriages on railways.

Dated November 12, 1857.

2853. James Stevenson, jun., of Glasgow, merchant. Improvements in lighting apartments and passages.

2855. Stanley Webster, of Bolton-le-Moors, foreman. Certain improvements in machinery or apparatus for turning.

2857. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in castors. A communication from J. C. Dubois.

Dated November 13, 1857.

2861. Anguish Honour Augustus Durant, Esq., of the Conservative Club, St. James's. An improved apparatus for husking and winnowing castor seeds for the purpose of obtaining a larger quantity and a purer kind of oil therefrom when pressed than heretofore with the outer skin or cuticle on.

Dated November 14, 1857.

2863. George Haseltine, gentleman, of Washington, U.S. Improvements in machinery for the manufacture of small metallic chains. A communication.

2865. James Henry Bennett, engineer, of Leith. Improved compound safety valves.

2867. Alfred Vincent Newton, of Chancery-lane. Improvements in apparatus for retarding and stopping the progress of railway trains. A communication.

2869. John Fereday, of Wolverhampton, engineer. An improved form of steam engine.

Dated November 16, 1857.

2871. Jean Baptiste Donas, of Paris, artist. A new optical instrument, which he calls physioscop.

2873. John Edward Hodges, of Leicester, manufacturer. Improvements in the manufacture of looped fabrics.

2875. James Taylor, of Birkenhead, engineer. Improvements in dredging machines, which improvements are also applicable to other purposes.

Dated November 17, 1857.

2877. Thomas Field, stay cleaner, of Spring-place, Kentish Town. A new method or mode of, and appliances for, submerging submarine telegraph cables.

2881. William Pidding, of Southwark-bridge-road, gentleman. Improved manufactures and improvements in the manufacture of piled fabrics, or of mosaic or tesselated textile and other fabrics, and improvements in some of the machinery or apparatus necessary to produce them, also the application of certain existing or known machinery or apparatus for their production.

2883. Solomon P. Smith, of Crescent, New York. Constructing iron wheels for railway carriages and similar purposes.

2885. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. Improvements in gas-burners. A communication.

2887. Edward Daniel Johnson, of Wilmington-square, watchmaker. An improvement in the construction of fuzee watches.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," December* 1, 1857.)

1973. J. Wright. Improvements in the manufacture of gas.
2016. A. V. Newton. Improved machinery for grinding and polishing stone, glass, and other materials. A communication.
2017. J. Kirby. Improvements in hay and other rakes.
2027. C. Norris. Improvements in the manufacture of sulphate of alumina, and the application of the same so manufactured, in dyeing, printing, paper making, and such like purposes.
2028. J. Needham. Improvements in fountain pens.
2030. T. Williams. Improvement in the construction of ships or vessels whereby their draught may be regulated.
2032. W. Johnson. Improvements in looms for weaving.
2033. J. S. Collins. Improvements in reefing and furling of ships and other vessels' sails and in the manufacture of the same.
2040. R. A. Brooman. Improvements in motive power engines. A communication.
2050. W. S. Clark. Improvements in automatic feeding printing press. A communication.
2051. E. Hallen. Improvements in the construction of bedsteads and similar articles to recline or sit on.
2052. O. H. Smith. An improvement in supplying steam to water to heat the same, and in preventing what is technically called priming of steam.
2058. E. W. Baxter. An improved mode of preparing glass labels, advertising tablets, and ornamental devices upon glass.
2063. J. Bethell. Improvements in the construction of ships and other vessels.
2104. J. Elce and J. Leech. Improvements in self-acting temples for looms.
2160. G. T. Bousfield. Improvements in sewing needles. A communication.
2165. P. E. Laviron. Improvements in apparatus for curing smokey chimneys, and for increasing the draft in them.
2174. G. T. Bousfield. Improvements in the preparation of dough for bread, pastry, cake, and other farinaceous articles of food. A communication.
2252. W. Staufen. An improved method of treating agava americana, or Mexican grass, and the manufacture of a new fabric therefrom.
2253. A. V. Newton. Improvements in machinery for preparing, roving, spinning, and twisting fibrous substances. A communication.
2548. R. Atkinson. Improvements in garments as part of male attire.
2554. A. V. C. Regnauld. A universal preservative medicine.
2650. W. Holroyd and S. Smith. Improvements in looms for weaving.
2674. W. E. Newton. Improvements in the manufacture of drawing rollers. A communication.
2699. J. Smith. Improvements in horse-hair crinoline for petticoats.
2708. J. Thom and H. McNaught. Improvements in looms for weaving.
2731. A. West. Improvements in the manufacture of candles.
2760. J. Davy and W. Bentley. Certain improvements in looms for weaving.
2776. J. Fry. An improvement in cementing fabrics when India-rubber is employed.
2805. J. Miller. An improved arrangement of marine steam engines.
2853. J. Stevenson, jun. Improvements in lighting apartments and passages.
2863. G. Haseltine. Improvements in machinery for the manufacture of small metallic chains. A communication.
2873. J. E. Hodges. Improvements in the manufacture of looped fabrics.
2858. S. P. Smith. Constructing iron wheels for railway carriages and similar purposes.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2485. James Hartley.
2491. Richard Roberts.
2494. Walter Blundell.
2503. Thomas Restell.
2510. George Gowland.
2512. Sydney Smith.
2513. John Moore Hyde.
2519. John Mason and Leonard Kaberry.
2521. John Sands.
2523. Frederick Le Mesurier.
2525. Joseph Whitworth.
2528. Julian Bernard.
2585. John Thom.

LIST OF SEALED PATENTS.

Sealed November 27, 1857.

1505. Milivoi Petrovitch.
1526. Edouard Alexandre.
1527. Moses Clark, Henry Oldfield, and William Salmon.
1539. Frank Perks Fellows.
1540. William Henry Walenn.
1573. William Miller.
1589. Edmund Knowles Muspratt, and Balthasar Wilhelm Gerland.
1624. Joseph Sharp Bailey.
1652. Charles D'Ambly.
1660. Robert Mushet.
1696. Gustave Margfoy
1711. James Champion.
1763. Henry Genhart.
1991. William Cliff.
2245. George Wirgman Hemming.
2430. Thomas Webster.

Sealed December 1, 1857.

1553. Newton Bentley and John Alcock.
1559. Edmond Roy.
1577. Thomas Latham Boote and Richard Boote.
1592. Hiram Powers.
1603. Edgar Brooks.
1650. Benjamin Noakes and Frederic John Wood.
1655. Eugene Barsanti and Felix Matteucci.
1665. Alfred Vincent Newton.
1671. William Edward Newton.
1794. Robert Hattersley.
1825. Thomas Hardcastle.
1832. Thomas Brewer.
1875. John Alison.

2181. Richard Talbot and Benjamin Croasdale.
2290. Thomas Bradford.
2410. John Smith Barden, Aaron Watkins Rockwood, Holmes Hinkley, and Daniel Franklin Child.
2449. John Absterdam.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

Received.—Mr. Ayrton's "Wave Line" papers, Mr. Howard's letter on "Hydraulic Cylinders," Mr. Recordon's letter on "Trisecting Angles" (which we cannot insert), and several short letters from "J. A. D."

W. A. Bendelow.—Your plan for launching the "Leviathan" is quite impracticable.

J. S.—Your method of checking the egress of submarine cables was patented some weeks since.

F. B. Whitaker.—We give every week a list of the patents upon which the third year's stamp duty is paid.

B. Cheverton.—We really cannot find space for your letter, in which you partly explain, and partly vindicate the sentence which "C. W. M." criticised in our Magazine for Nov. 7; and we do not agree with you in thinking that your letter was quoted unfairly. We think it would be very unfair, indeed, were we to permit you to charge him with the least want of candour in the matter. The sentence was unquestionably erroneous, and, in all probability, misrepresented your own views. "C. W. M." said nothing to the contrary.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1792.] SATURDAY, DECEMBER 12, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

PYM'S PATENT MACHINERY FOR RAISING SUNKEN VESSELS.

PYM'S PATENT MACHINERY FOR RAISING SUNKEN VESSELS.

Mr. J. Pym, of Pimlico, has patented an improved system of machinery to be employed in raising sunken vessels, and other submerged bodies. He constructs a ship of light draught of water divided longitudinally into two parts or halves, each part being a vessel complete in itself, and so formed that the two, when placed side by side, form a double or duplex ship. This ship he fits with a number of jointed sheers or cranes, one leg of each being sustained by each half of the ship. He causes the duplex ship to be propelled over the sunken vessel, and then separates the two parts of it in the manner shown in the engraving on the preceding page, keeping the parts from separating beyond a safe and convenient distance by means of chains or rods connecting the two together. Chains are passed, by divers or otherwise, around the sunken vessel, and to these chains are fastened others leading from the sheers or cranes. The vessel is then raised, by suitable capstans or other apparatus, to a sufficient height, as shown by dotted lines in the engraving, and the hulks with their burden between them are then propelled or towed to any required place.

HALL AND CHARLTON'S PATENT STEAM AGRICULTURAL APPARATUS.

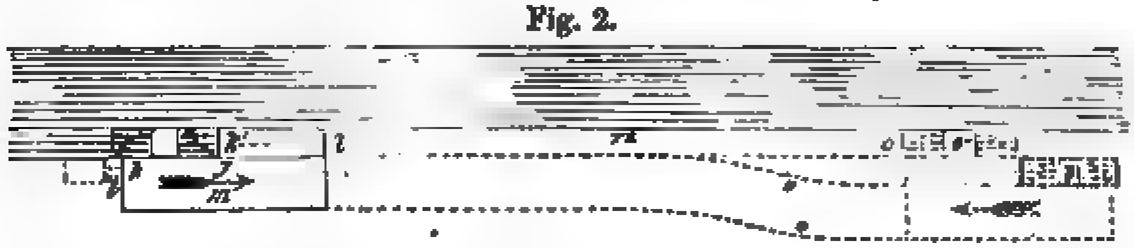
At the Salisbury Meeting of the Royal Agricultural Society, the apparatus of Messrs. Hall (of Knavestock) and Charlton (of Brentwood), attracted considerable and well-merited attention. The nature of their improvements we propose now to place before our readers. They consist, *first*, in preventing in agricultural engines the priming consequent upon the boiler being thrown out of the level, by providing steam pipes leading to the steam cylinders from different ends or parts of the boiler, and in taking the steam for the cylinders from that part of the boiler where, from its position, steam only will enter the cylinder supply pipes. *Secondly:* In providing a means for turning the engine and boiler, on their arrival at a land's end for instance, by means of a cylinder and piston worked by hydraulic power, or by steam from the boiler itself. The cylinder is placed under the boiler and engine-carriage in such position that the whole boiler, engine, and carriage may be raised and turned upon the cylinder as a centre. *Thirdly:* In gearing together two or more wheels in locomotive engines employed in agriculture from near the periphery thereof, and in applying clutches thereto for throwing the wheels into and out of gear, as required. *Fourthly:* In steering engines employed in agriculture by making use of a worm and worm-wheel; the worm wheel is connected to a spindle which is attached to a double eye or box, which embraces the axle for carrying the engine, or that part of it on the steering wheels; the double eye is likewise connected to the axle by a bolt in such a manner as to allow the axle to partake of a slight up-and-down motion. A shaft is carried from the worm to any convenient part of the engine, and has a steering wheel keyed thereon. By this arrangement, the person who drives the engine may also be enabled to guide it. *Fifthly:* In connecting ploughs, or frames for ploughs, or other implements for tilling the soil, both before and behind a locomotive engine, and in providing the implements with the means of being thrown into and out of work. The connections are so arranged that, while the implements continue to travel in a straight line on approaching the land's ends, the engine, commences to turn into fresh land. On the arrival of the implements at the land's ends, they are thrown out of work; the engine having been shifted over into fresh land, those implements which were previously out of work are brought into action, while those which had operated up to the land's end are kept out of action until the engine arrives at the end of the fresh land about to be operated upon. In some cases they connect the implements rigidly to the engine, to enable them to take advantage of the weight of the engine. Again, where they only apply one set of implements, either in front or behind, or at the side of the engine, they so construct and fit the implements in double sets, as to enable one set to act on being pushed, and the other set on being pulled by the engine.

The first part of the invention—the prevention of priming — is accomplished by placing two pipes in or on the boiler, one at each end, or nearly so, and fitting suitable valves to them, in such manner that they can both be worked by the same rod and lever. Fig. 1 of the annexed engravings represents a portion of a steam boiler, A, with this apparatus applied thereto. B B are steam domes mounted on the top of the boiler, one near each end. C C are steam pipes fitted thereto. These pipes have suitable valves, D D, mounted on the ends of the steam pipes, C C. These may be connected by a rod, E, as represented, working through stuffing boxes, F; or one rod may be attached to each valve, so as to be capable of being worked singly. As represented, they are moved simultaneously by the short arm, G, of a bent lever, and worked by the handle of the long arm, G′. In working with an engine, fitted with this apparatus,

on uneven ground, that valve which is on the highest end of the engine, for the time being, is kept open, while the valve on the lower end is shut; when the valves are connected by the rod, E, as shown, one movement of the levers, G and G′, by hand, effects this. In some cases the inventors make the opening and shutting of the valves automatic, by means of a pendulous lever, H, and weight, I, attached to its lower end, both of which are represented in dotted lines. In this case the valves are connected, as shown, or, if they are not connected, two levers and balls may be employed, one to each valve. It will readily be seen that, so long as the engine moves on even ground, the lever and weight, H and I, will, by their gravity, hang perpendicularly, and so keep both valves, D D, open, or partially so; but whenever the engine moves over uneven ground, the action of the lever and weight on the valves, through the rod, E, will cause the lower valve to shut, and the higher one to open, and thus the engine always takes steam from that part of the boiler which is highest for the time, and priming is thus prevented. To turn an engine and boiler at a land's end, the inventors make use, as we have said, of a hydraulic, or steam cylinder attached to the underside of the boiler, so as to lift the engine and boiler off the ground, and then turn or swivel them round on the piston-rod or ram, as a centre or pivot.

Fig. 2 is a diagram, showing the manner in which the fifth part of the invention is carried out. The part, *j*, represents the engine with its double set of implements, *k k′*, attached by chains, or other connections to bars, *l l′*; these bars are firmly secured to the fore and after part of the engine framing, and project to any convenient distance on either side. The engine and implements move in the direction of the arrow, *m*, along the path marked in dotted lines, parallel to each other, until they arrive at the point, *n*, where the engine is steered in or along the curved path, *o*, until it has so far diverged from a line with its former or parallel path, that as much fresh land is included between the two paths as is to be cut or operated upon by the implement at present out of work, on its return along the field. While the engine has been made to travel in a curved line, the implements have been steered so as to continue in a straight line to the land's end, when they will assume the position *o′* and *o″*. The implements are then removed into the position, *p*, when the whole are in a position to traverse the field in a reverse direction; but instead of the implements being dragged by the chain which attaches them to the fore end of the engine framing, they are dragged by the chain attached to the bar, *l*, which is fixed to the back end of the engine, and that set of implements which was in work before arriving at the land's end, as shown, is now thrown out of work, and the set which was out is now thrown in work. The engine and implements are then caused to traverse in a reverse and parallel direction towards the other land's end, when the same processes of steering the engine out of a parallel path, and keeping the implements parallel are repeated. In some cases they fix the implements rigidly to the frame of the engine, so as to take advantage of the

Fig. 2.



weight of the engine. Or they may be jointed to the framework of the engine. They can be lifted by any suitable apparatus out of work, but, when in work, they may be kept rigid by any suitable means.

OTWAY'S PATENT FOLDING SCYTHE.

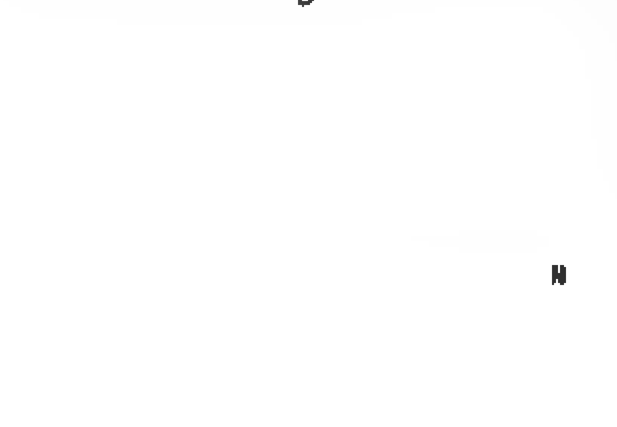
MESSRS. BURGESS AND KEY, the agricultural implement makers, of Newgate-street, London, are manufacturing an improved scythe, patented by Mr. Robert Otway, engineer. This scythe is constructed with several very valuable improvements. In the first place the blade may be set at any required angle with the ground; secondly, the position of the blade, with respect to the handle or snath, may be altered and fixed in any position desired; and, thirdly, the blade will fold and lie in a line with, or be protected by the handle, for portability.

Fig. 1 of the annexed engravings represents the scythe complete and folded. A,

Fig. 1.

is the snath; B, B, are the handles mounted thereon; C, is the blade, which has a portion of the heel, D, turned up at or about right angles to the blade; in the end of the turned-up portion, D, an eye is formed. The several parts are better seen in figs. 2 and 3, which are different and detached views of the jointed parts. Fig. 2 is a plan

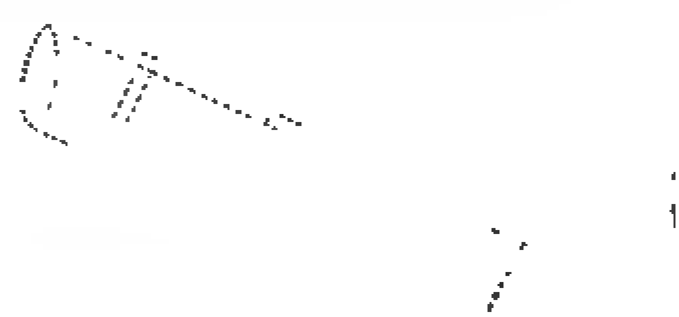
Fig. 2.



of a portion of a scythe blade with the parts for fixing it to the snath attached thereto; fig. 3 is a view of the same looking towards the heel of the scythe from behind. In this view the snath is represented by dotted lines, A, A. F, is a quadrant-shaped piece of metal, which has a similarly shaped slot, G, formed in it. H, is a portion of the quadrant piece; it is formed on, and projects downwards from the quadrant, at right angles, or nearly so. In the projection, H, a hole is formed and tapped; a screw, I, is passed through the hole or eye in the heel part, D, of the scythe blade, and then screwed into the tapped hole in the projection, H, thus firmly securing these parts together. J, is a pin or pivot formed on the quadrant piece, F. This pivot projects upwards and is inserted in a hole or eye in the plate, L. Through the slot, G, G, a screw, M, is passed, and is then screwed into a tapped hole formed in the plate, L. The plate, L, is placed in a recess formed in the butt of the snath, and is firmly and permanently secured thereto by bolts, screws, and nuts, O, O, which bolts are passed through holes, P, P, in the plate, L, and through corresponding holes in the snath, A, A.

To set the blade, C, in a proper position relative to the snath, A, and to the surface of the ground, the screws, I, and M, are unscrewed, the blade is then at liberty to be moved into the position required, when the

Fig. 3.



screws, I, and M, are tightened, and thus the snath and blade are secured as they have been set. Either the screws, I, or M, may be made use of separately to set the blade, the screw, I, being made use of when a vertical movement is required, and the screw, M, for a horizontal, as represented by the dotted line, Q, in Fig. 3. When the scythe is not required for use, both the screws, I, and M, are unscrewed until the

blade, C, is capable of receiving a vertical movement on the screw, I, and likewise the blade, C, and quadrant, F, a horizontal movement on the pivot, J. The blade, C, is then made to approach the snath, A; the screw, M, thus traverses in the slot, G, until the blade and snath assume the position shown in fig. 1, when it is more easily and safely carried from one place to another, and also more readily stowed away.

MACHINERY FOR WORKING WOOD.

At the meeting of the Institution of Civil Engineers, on Dec. 1, 1857, the discussion upon Mr. Molesworth's Paper "On the Conversion of Wood by Machinery" was continued throughout the evening.

Exception was taken to the Author's preference for the wood framing generally used in America. It was asserted that the screws soon worked loose, the joints became slack, and the framing trembled. Cast-iron framing was more durable, and it was easy to neutralize the vibration by inserting beneath the plummer blocks, sheet lead, or strips of wood.

The timber most worked in America was soft, and did not require such careful working, or such a smooth surface, as that worked in England, where, on account of the higher price of the material, it was necessary to avoid waste.

Great difficulties had been originally experienced in setting circular saws, so as to make them run truly; but since a soft packing had been adopted, they could be run at much higher speeds, and the larger plates could be made much thinner. It was asserted, that none of the American circular saws could produce such a good surface on flooring boards as could be given to them by the fixed planes, under which the boards travelled. It was only necessary to keep the planes in good order, and to make the boards travel sufficiently quick. Straight-planing could be performed at the rate of 50 feet to 60 feet per minute, by fixed planes; whilst the edges of the boards could be worked off square, or be ploughed and tongued by circular cutters. The speed of the circular saws in this country rarely exceeded 7,500 revolutions per minute; at that speed thin saws were worked, whilst those used in America were much thicker.

A description was given of a simple mode of planing on the timber sleepers the seats for the iron railway chairs. The sleepers were fastened, with their faces downwards, upon a carriage, travelling on a small railway; and two revolving planes, working upwards, cut the seats simultaneously, with perfect precision, both as to depth and parallelism.

At the establishment of the late Mr. T. Cubitt, all the sawing was performed by circular saws, and beautiful specimens of work were exhibited. The timber could be cut to any angle by saws fixed in rising and falling spindles, some of which made as many as 6,000 revolutions per minute; the men, however, generally preferred about 3,000 revolutions. Any vibration was very prejudicial to the work, and it was essential that every part of the high-speed machinery should be perfectly balanced. The question of speed resolved itself into the consideration of quantity against quality; the greater the speed the coarser would be the quality of the work done.

On behalf of American tools it was urged, that they were found sufficiently strong and steady for the work they had to perform. They were cheaper, and the wooden frames could be easily and cheaply renewed, when they became unsteady. The bearings lasted longer than upon iron frames. The American saws had fewer teeth than the English, and were found to cut cleaner. The teeth were generally filed in triplets, the first with a bevel to the left, the second straight, and the third with a bevel to the right; thus they cleared themselves the more readily, and cut much cleaner. The rotating cutters were found to take less power for a given quantity of work than the stationary planes.

To this it was replied, that whilst the rotating cutters were sharp, they did good work, but they were much sooner worn down than the stationary plane, and then the surface produced was ragged. The common carpenter's plane was very nearly a perfect instrument, and the great object was to produce a machine which should, as nearly as possible, imitate its action, and, by habit, the workmen, in feeding the stationary planes, presented the wood to the tool in the manner best suited to the quality, and so as to accommodate the cut to the knots. Between 30,000 feet to 40,000 feet of flooring boards could be produced per week with a good stationary plane.

Smart's circular saws were originally about one-eighth of an inch thick: thus wasting much timber. The late Sir Isambard Brunel then introduced the large veneer saws, put together in segments; Holland invented the system of packing the saws, and now they could be worked at very high speeds, when 36 inches diameter, and only 14 gauge in thickness. It was found advantageous to leave a space of 2 inches between the teeth, when the saw had its full diameter of 36 inches, and when, by constant sharpening, the diameter of the

saw decreased, the space between the teeth diminished in a regular proportion.

It was urged that the production of high finish by machinery was a difficulty, but not an impossibility. Hitherto the study had been to produce quantity; and quality of work had been sacrificed to it. It was argued, that the practice of wood working was not perfect, and that much might be done by due attention to the subject. The points which required the greatest care were undoubtedly high speed and perfect balance, and it was stated that the correct proportion of the speed of travel of work to that of the cutters was too generally overlooked. The American speed, of 1-20th of an inch travel for each stroke of the cutter, was given as applicable for ordinary purposes, but was far too slow a speed for high finish. The system of reducing the work, by sawing as nearly as possible to its finished dimensions, was recommended; and the adoption of roughing cutters in some cases, and also cutting with the travel of the work, instead of against it, were stated to be conducive to high finish. The advantages of a solid bed, the proper angles of cutters, steady bearings, and cutters highly tempered, and kept well sharpened, were insisted upon as indispensable to finish. It was urged that the Americans had made much more progress than the English in the appliances of machinery, and Mr. Whitworth's report was quoted, as confirming this view; at the same time it was conceded that the machines which were manufactured by Worssam and M'Dowall were superior in workmanship to those of America.

CHEMISTRY OF PIGMENTS.

BY DESMOND G. FITZGERALD.

THERE are many points of view in which the importance of science employed practically is evident. With regard to art, there is one subject worthy of the consideration of those who follow the great idea of rendering science, which hitherto has been mostly followed for its own sake and for its ennobling tendency on the human mind, available for the purposes of life. It is a subject of the highest interest both to painters and those whose taste and fortune enable them to patronize and advance the fine arts, and it is one to which very little attention has hitherto been given. We allude to the chemistry of pigments, and the effects upon them of an impure atmosphere.

Most of the pigments used by artists are chemical compounds, some of them of a very active character. Thus flake white, a compound of the oxide of lead and carbonic acid gas, exchanges this latter for the sulphur existing in foul exhalations whenever it may be exposed to them, and also abstracts the same element from orpiment, becoming in both instances of a *black colour.* Again, when used with the yellow pigments made from lead, or with red lead, it destroys their colour. All colours compounded of lead are liable to become black through exposure to an impure atmosphere, and therefore to none of them can the artist safely trust his reputation as a colourist; yet are these pigments universally employed by artists. We have cited but one or two chemical facts, and these alone would prove the necessity of our being guided by science in matters connected with art. Chrome yellow (the chromate of lead) is of itself a beautiful colour; but it is transitory, and destroys both Prussian and Antwerp blues when mixed for greens. What artist, unacquainted with the chemical nature of the pigments he employs, could foretell such a result?

This reaction occurs almost immediately; but those which are gradual, and only perceptible after a considerable period, are far more prejudicial to the interest of art, destroying its most beautiful monuments, and obliterating the happiest efforts of the painter's skill. Surely some degree of importance ought to attach to the substances by which the artist's thoughts should be (we cannot say is) rendered all but immortal. But with the artist the thought is everything, and very little attention is paid to the material in which it is expressed; so that with regard to pigments, and to many processes of art, the assistance of science has been rarely sought. Even when the painting of the greatest value is to be cleaned, it is seldom entrusted to a person possessed of the scientific information necessary for such a work; and the *picture-renovator* does not always know that one of the effects of the alkaline solvents he employs is immediately to discharge the colour of Prussian blue and Prussian brown. Ibbotson gives an amusing account of picture-cleaning, as practised in his day; and we cannot say that the process has hitherto been much improved upon or more carefully practised:—"Good comes out of everything. I, by looking over the intelligent being (the picture-cleaner), when it was scouring day, had the pleasure of seeing all the different coats or strata of a variety of pictures vanish one after the other, from the epidermis, or last transparent finishing, down to the raw dead colouring, beyond which he seldom ventured. But I am under the greatest obligations to my dear old friend John Evans for going still further; he certainly was in his time the best of all possible grubbers, though in the present day we do not

want 'five hundred good as he.' He, by means of a delicate Malmstock (brick) and water only, used to let me see on what coloured grounds the ancients all painted; he fetched off everything except a stubborn bit of heightening. Mr. Peter Broyet, another of these notables, did the same thing, but could not, for his life, make his work as smooth as John: he was one of the old sect of sand and scrubbing-brush, and has numerous followers. However, the prevailing schism of the searching soap-ley, which finishes the canvas and all, bids fair to become the rage." Quitting the subject of picture-cleaning, it is evident that more attention should be paid to the materials employed by artists. They should be manufactured under the superintendence of science, whose task it should be to introduce new pigments, to exclude those that are worthless, and to perfect those which are deservedly in common use. It would also be most expedient that they should be labelled—1st, according to their popular designation; 2nd, according to their chemical characters and reactions, and their permanency, *e. g.*:

Naples yellow.
Oxides of lead and antimony.
Iron discharges its colour.
Generally permanent.

Red lead.
Protosesquioxide of lead.
Cannot be used with the carbonate.
Becomes *black* when exposed to foul gas.

The advantages which would result from this course cannot be questioned. Leaving the artist to use his own discretion in the employment of any colouring material, it would incontrovertibly point out facts to its advantages or otherwise, which the artist could not fail to profit by.

We have spoken of white lead: this is a substance employed not only by artists, but also by a large class of persons upon whom it produces peculiar and deleterious effects. Few poisons are productive of as much evil as this pigment, which might so easily be replaced by one possessing neither its transitory nature nor its poisonous properties, viz., the oxide of zinc. The effects of carbonate of lead on the human system are due, not only to the minute quantities which find their way into the stomach, and which are productive of the disease called painters' colic, but also to a compound formed by the paint in drying, which often collects on the surface of vessels of water placed by the workmen to absorb it. This compound appears to be one of the metal with hydrogen gas, which is remarkable for the insidious and deadly character of its combination with several other elements. In the house-painters and glaziers we have a painful example of the diseases to which certain trades and classes are liable. In this instance the remedy is to supersede the employment of white lead by that of zinc white, a beautiful and innocuous colouring material, perfectly unalterable by exposure to light, moisture, and foul-air.

We cannot but think that the objection to the *want of body* of zinc white is untenable, and, from the answers we have received from the journeymen painters before whom we have placed the question, it would appear that the objection to its use consists principally in a prejudice of trade. Its advantages may be seen, but disadvantages are suspected, and from being unknown, are only the more formidable. Thus the house painter, accustomed from his earliest apprenticeship to the use of lead paint, is easily persuaded, even in face of its deadly effects, to sacrifice his health to the interest or prejudice of his employer, as his father or teacher may have done before him.

THE ELECTRIC CONSTANT LIGHT.

The great difficulty which scientific men, who have experimented in the production of electric light have had to contend with, in order to render it constant, has been that of keeping up an uniform distance of separation between the electrodes, without which it is well known a steady light cannot be generated. In the endeavours to accomplish this desirable object, a variety of apparatuses have from time to time been constructed on the principle of an approximating motion between carbon pencils, but none of these have been completely successful. If a continuous independent movement of the pencils was given, the light soon became extinct, either the motion being too rapid or too slow. The passing electric current was then made the governor of the motion; but as this only produces its effect by a cessation in the current, it must necessarily give rise to an inconstant light, the fluctuations therein being greater or less according to the amount of friction in the moving parts. Wright, in 1845, proposed to produce an uninterrupted light by the employment of two revolving carbon discs, instead of pencils, and Le Molt and Staite also, in 1848, patented other arrangements of discs. The use of discs was, however, soon abandoned; they being, we believe, found liable to crack or fly from unequal expansion. In 1852, Mr. Allan introduced a very excellent rotating electrode, formed with a spiral

edge, by means of which a very superior result was obtained. In 1853, Binks substituted streams of mercury for the electrodes; and, since then, other experimenters have made endeavours to produce electric light on his plan. But mercury, though it does yield a white light, or rather one of a bluish tint, is less intense than that produced by pure carbon; the powerful evaporation which mercury undergoes gives rise to dense vapours, which disturb the light, and should they by any means escape from the lamp are likely to produce the most injurious effects. More recently, Mr. Harrison has patented what he terms "the Electric Constant Light" apparatus, and of this it is that we now propose to speak, having seen it in operation at a late private exhibition. The light which we then saw was perfectly steady and continuous, of a clear white, free from vapours, and, in fact, a little sun in appearance. The electrodes are carbon, the negative being a point or pencil, and the positive a barrel or hollow cylinder, which, by simple clockwork, has imparted to it a rotary as well as horizontal motion, whereby a constant supply of fresh material is obtained. The cylinder can be made of a size to "burn" for any required length of time. The apparatus is more simple and compact than any we have before seen, and can be covered with a small ground glass bell-shade, affording a most soft and pleasing light. Mr. Harrison informs us that some experiments which he has made have confirmed him in the opinion that the quantity of matter disengaged from the pole of the light-giving positive electrode, is definite for a definite quantity of electricity, as established by Faraday in electrolysis. Carbon he considers to be peculiarly adapted for the production of electric light, from the ease with which its molecules admit of being detached by the current, as well as from its low equivalent; six pounds of carbon affording, with the same quantity of current electricity, a duration of light equal to that of two hundred pounds of mercury. We understand that "the Electric Constant Light" is about to be applied to lighthouse purposes, where its capabilities as a coast light will be thoroughly tested.

WIRE BULLETS.—It is proposed to manufacture bullets from lead-wire by coiling the wire upon rests at the top of the machine, and suspending it by means of arches, from which the lead is fed downwards into the machine, where it is measured and cut off as required for each bullet; it is then compressed into the desired form by forcing through dies.—*Mining Journal.*

THE LAUNCH OF THE "LEVIATHAN."

Thursday, Dec. 10, 1857.

THE whole distance traversed by the ship on Thursday last was 14 feet 9 inches forward, and 12 feet 7 inches aft. The distances attained on subsequent days were as follows:—On Friday, 29 feet 2 inches forward, 30 feet 6 inches aft; on Saturday, 7 feet 8 inches forward, 4 feet 2 inches aft; on Monday, 10 feet forward, 3 feet 4 inches aft; on Tuesday, 4 feet 9 inches forward, and 4 feet 2 inches aft; (on Wednesday, she did not move); this day, 12 inches forward, and 1 foot 3 inches aft. On Thursday the 3rd, a 12-inch press was burst. On Friday morning, the ship made her greatest run, viz., 7 feet 4¾ inches aft, and 5 feet forward. On Monday, two of the pipes belonging to the presses burst. The most remarkable fact observed during the week is, that several times, after the strain has been let off the presses and purchases at one end—those at the other end being kept taut—the vessel has started bodily.

Mr. W. Roberts, the patentee of the improved ships' pumps recently noticed in our pages, and who has charge of important parts of the launching apparatus, has published the following narrative respecting the anchors used, in reply to a statement of Mr. J. Trotman's. Mr. Roberts says:

The mooring anchors used at first were made by cutting one arm off from old anchors, some of them about a century old; their weight being from 50 to 70 cwt., these were buried in the beach on the Deptford side of the river. On Thursday one of Trotman's 4-ton anchors was laid down in the bed of the river, and the chain led to the sternmost barge. On Friday morning it was found that the barge was coming home, and at low water the old anchor was found with the stock broken, and the anchor on its side near low-water mark; at this time one of Lenox and Co.'s 3½-ton anchors was hanging to the bow of the lighter ready to be laid. This was done, and the chain taken to the barge, when, after coming home a few feet more, enough to set the Admiralty anchor, her further progress was stayed; hence the purchase that assisted to get the ship 30 feet 6 inches—not 36 feet, as stated by Mr. Trotman. These anchors stood until Tuesday morning, when they were both brought home. They have both been lifted and taken back this day, and another 3½-ton Admiralty will be laid this evening to assist them. At the stem of the ship a similar arrangement had taken place; but in this case the Trotman's was taken well up the beach, and a small hole dug to enter the point. On Friday night it had come home 8 feet, and gone down so that the shank was about 6 inches above the ground. On Saturday

morning it was found that the old mooring anchor was drawn through the stock, and on its side. When we commenced heaving, it soon became evident that Trotman's anchor was coming home fast; and had not Captain Harrison given orders not to pull it below low-water mark, as he wanted to back it, it could have been pulled 124 feet as easy as 24. On Sunday morning an old anchor, not an Admiralty or a Lenox and Co., but one without a name, weighing about two tons, was placed at the back of it; also one of Trotman's, weighing with the stock nearly 7 tons, was sunk to the shank on the beach, and on Monday the 4-ton anchor continued to come home, but the strain has not yet come on the large one. On Monday, one of Lenox $3\frac{1}{2}$-ton anchors was laid, and taken to a barge, fast to the fore foot by a large tackle. This barge having grounded before the slack chain was hove in, was pulled bodily over the mud until the chain became taut, and the anchor got set (about 30 feet), where it has stood ever since. If any of your readers will take the trouble to go to the Deptford lower water-gate they will find, instead of cinders and soft mud, a bottom that a pick-axe will scarcely penetrate. With regard to the Admiralty anchor, I beg to inform you it is not the same shape as when it was tried at Sheerness, but has been very much improved; and with regard to the American anchor which Mr. Trotman has thought fit to drag in, Messrs. Lenox and Co. were, as manufacturers, only responsible for material and workmanship, and I find by reference to appendix No. 10 to the reports, that Trotman's anchor broke at $53\frac{1}{2}$ tons, the much-abused Admiralty at $56\frac{1}{2}$ tons, and the American at 63 tons, while the two Trotman's anchors tested at Woolwich last month, although of four times the weight, broke at 92 and 101 tons respectively.

We have perfect confidence in the above statements of Mr. Roberts. Our readers will remember that when Trotman's anchors were first used there was nearly double the power brought to bear upon the various parts of the ship. (See our last Number.)

Thursday, 5 P.M.

It has this afternoon been determined to drive piles on the Deptford shore to receive the stress of the chains, as the bed of the river appears to be so rotten that no anchors will stand against the immense strain put on them, unless a great number are used together.

An American-built Russian Corvette Launched.—A steam corvette, to carry twelve guns, built for the Russian government by Wm. H. Webb, of this city, was successfully launched on the 16th ult., with her propeller and a portion of the main shaft in place. It was feared that this heavy weight at the extreme end might spring her amidships; but not the least variation in her shear was perceptible after launching, thus demonstrating the great strength of her construction. This, we believe, is the second steam vessel of war which has been built for the Russian government in New York. Thus it is, the New World is leading the Old. American divers are engaged to raise the sunken vessels at Sevastopol, and Americans build Russian railroads and steam vessels of war. —*Scientific American.*

HAFFNER'S REGISTERED UPPER DRAFT CHIMNEY TOP.

T. P. Haffner, Esq., of Temple Hill, East Budleigh, Devon, has registered the chimney top shown in the accompanying engraving, which he calls "The Upper Draft Chimney Top." The figure represents an external side view partly in section, a portion of the outer casing being supposed to be broken away in order to expose the internal arrangement. A is the body, B the cowl, C the vane, D the rod on which the cowl, B, turns. E is an inclined and F a horizontal, or nearly horizontal, partition over which a current of air is led through the upper part of the cowl. The passage of this current out of the cowl creates or encourages an upward draft through the body of the chimney top, and the lower part of the cowl. The advantages of the improved top are the production of a strong upward current through the chimney to which the top is applied, the improvement of the combustion of fuel burnt in stoves connected with the said chimney, and the improvement of the ventilation of apartments connected therewith.

MR. C. WYE WILLIAMS'S AIR METER.

The following account of a meter used by Mr. C. Wye Williams, for measuring the air which enters furnaces, &c., is given in the *Journal of the Society of Arts*, of Dec. 4.

Mr. Williams's air meter consists of an ordinary circular vane, through which the air has to pass during the operation, producing motion like that of a windmill, increasing in rapidity in proportion to the strength of the current passing through it. This circular motion of the vane is transferred to a series of dials, similar to those of the ordinary domestic gas meter. The number of revolutions of the vane are then recorded in units, tens, hundreds, &c., up to 100,000, thus enabling an experiment to be continued during above 100 minutes. This vane is eighteen inches in diameter, and the inventor, having ascertained, by a measured cylinder, after a due adjustment of the leaves, that the quantity passed during a given number of revolutions was equal to one cubic foot for each revolution, has taken that as a sufficiently reliable datum for calculating quantities. The number given by the index dials, then, will represent the number of cubic feet that have *entered* a furnace or been *drawn out*, as the case may be, or escaping by the chimney, under the different circumstances of high or low temperature, with partial or complete combustion.

Mr. Williams adds:—"The vane is hung with such delicacy and is so easily set in motion that the loss by friction of the machine need scarcely be taken into account.

"Among the applications of this meter one may here be mentioned, as it enables us to estimate the absolute and relative value of the draught produced by jets of air or steam when thrown into a chimney for the purpose of increasing the draught. By this means I have been enabled to correct numerous practical errors as to the best mode of economising the steam in the use of the jet under various pressures."

THOMAS'S PATENT SEWING MACHINE.

COURT OF QUEEN'S BENCH, WESTMINSTER, DEC. 7.

(*Sittings at Nisi Prius, before Lord Campbell and a Special Jury.*)

THOMAS V. FOXWELL.

Lord Campbell, in summing up this case, said there were two questions for the jury,—whether the invention was novel, and whether it had been infringed. As to the novelty, the plaintiff disclaimed the novelty of any particular portion; it was only a patent for a combination, and the point to be considered was whether that combination was new. The plaintiff claimed four things,—the general arrangement of the machinery, the application of a needle in combination with a shuttle, the construction and use of a sliding frame, and the mode of actuating the frame and needle. If they believed that any one of these was not new they ought to find for the defendant. As to the infringement, this being a patent for a combination, if the defendant used any substantial portion of the new combination for the same purpose as that to which it was applied by the patentee the charge of infringement was supported, and it was not necessary that the whole combination should have been copied.

The jury found that the invention of the plaintiff was new as to all four points, and that the defendant had infringed it.

Verdict for the plaintiff—Damages, 40s., with the usual certificates.

MONSTER GUNS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—Permit me to make a few remarks upon a letter of Captain Blakely's, R.A., which just now I observed at p. 489, of your November Part, and again at p. 517.

I must deny the correctness of Captain Blakely's statements, that I ever, or in any way, informed him that I could not say which of us has the right of priority in the proposition to construct built up guns, and of the principles upon which they depend. I received a note in October last from Captain Blakely, in reply to which (perhaps, as he has referred to it, he will publish it fully) I replied that I could not then say, in the absence of documents, who had priority; but that on my return to Ireland, I would give him my dates, and he was free to use them as he pleased.

Now, the dates are these—On the 25th of June, 1855, I read before the Royal Irish Academy a paper, in which was contained the principles and general methods of carrying into practice the construction of built-up guns. Permission of council to read this paper had been obtained on the 18th of June, 1855, and the common sense mechanical principles upon which the whole theory of built-up guns depends had (as I could produce proofs of) been well known to me for months before; and, indeed, were first suggested to me, as well as I remember, as far back as 1850, by reading certain passages in Mr. Edwin Clarke's book on the Britannia Bridge—where (vol. i., p. 306, and note to 311,) facts may be found containing the germ of the whole thing.

On the 25th June, 1855, however, I *published* this construction of ordnance, and the general principles on which it depends, as they occur in the text of my book on artillery. I had framed, however, no exact mathematical theory expressive of those principles.

Now, the first edition of Captain Blakely's pamphlet, to which he draws your attention as the foundation of his claim, is dated in his preface, June 27, 1855, and must, therefore, at some later time than that—probably, at the earliest, some time in July, 1855—have been privately circulated, and his views for the first time so promulgated as, in his own words, "to do his best to keep his discovery secret."

I presume it is not necessary to say more as to with which of us the right of priority in discovery rests. That Captain Blakely has all the "rights" (whatever they may be) that belong to an *independent* author of whatever there may be new in his pamphlet of June 27, 1855, I do not mean to dispute; but it has been long and well understood that *first publication* establishes the right to priority in investigation, discovery, or inventions, and that subsequent publishers have no right. So much for the question between Captain Blakely and myself: but he also asserts his claim as against Dr. Hart. To the latter I was indebted for the complete mathematical investigation which I have published, with his permission, in note W, p. 259, of my work on the "Construction of Artillery." I can only say that my first communications from Dr. Hart were received very early in July, 1855. How much earlier than this he had investigated the subject, I cannot say; but apart from the mere question of date, it is pretty obvious that Dr. Hart is the only person who, up to the present hour, has given a correct mathematical theory of built-up ordnance to the world.*

I, therefore, cannot avoid expressing my conviction that Captain Blakely's claims to priority in mathematical investigation as against Dr. Hart, are as ill-founded as are his asserted claims to priority of invention in the methods of construction of built-up ordnance are against myself.

Captain Blakely, both in your Magazine and elsewhere—(see *Press* newspaper for October and November last)—lays great stress upon *his* construction of built-up ordnance as contradistinguished from mine, which he affirms consists *alone* in forming the interior of the piece of longitudinal staves. Let me beg his attention to the following words, section 284, p. 151, of my book: "For the purpose of reducing the maximum strain upon the former (that is, the shrunk-on external rings), by removing them further from the axis, it will often be convenient and advantageous to give a greater thickness to the voussoir bars, or *to the single cylindric tube which may constitute the chase of the gun.*"

If he will also turn to note K, p. 282, he will see that this "cylindric tube," being made of *cast iron, and hooped externally with wrought iron*, which constitutes the supposed novelty of Captain Blakely's patent of August, 1855, was quite familiar to me, and was proposed as an improvement by Captain Thierry, of the French artillery, as long ago as 1834. He will also see what are some of the objections to this most impractical and unsafe combination of cast iron and wrought iron.

One cannot help admiring the *naïveté* with which Captain Blakely, while coolly appropriating priority, and insisting upon his own merits as based upon it, "trusts that the question of priority will not be raised, *being totally unimportant!*" Sirs, I hate controversy; "as far as in *me* lies, I would live peaceably with all men," and I should never have occupied a line of your pages, that might be so much better filled, with this priority question, if Captain Blakely had let alone my "beautiful 36-inch mortars," as he is pleased to term them in *your* pages, while in those of the *Press*, "he does not think much of them now he has seen them," and had not unhandsomely tried to connect his name with them,—as though they owed one atom of their existence to him in any way, in theory, design, or structure!

With the remainder of Captain Blakely's letter about his own nine-pounder I have little concern. One statement in it, however, which "he hopes I have well considered," coming from an artillery officer (and I will do him the justice to say an intelligent and well-informed one), does startle me. He tells me "Gunpowder requires $\frac{1}{500}$ of a second to burn." What does this mean? Does he really imagine that any bulk of gunpowder, *large* or *small*, will take $\frac{1}{500}$ of a second to burn—that a mine of ten tons of powder, and the charge of a pistol, both being similar in form and ignited at one point, will be all burnt in the same time?

I should like to know the evidence for the $\frac{1}{500}$ of a second in any one case, or for *any* bulk not microscopic; for I myself happen to have *measured* with care, by means of the chronograph, the time that 60 lbs. of powder (in a quarter cask) takes to burn, and found it very nearly *one-twentieth* of a *second*.—(*Vide* Transactions of the British Association, 1851.)

I am, Gentlemen, yours, &c.,

ROBERT MALLET.

11, Bridge-street, Westminster, Dec. 2, 1857.

* Mr. Mallet does not, we presume, intend to imply by this observation that the investigations given by ourselves in our last volume, and which Dr. Hart agreed with, were incorrect. If he does, we should like to receive his objections to them.—EDS. M. M.

HYDRAULIC RAMS—LARGE GUNS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The bursting of an hydraulic ram at the launching of the *Leviathan*, reminds me of a very effective, simple, and easily applied remedy for such accidents. We have a ram attached to a very powerful lever-balanced proving machine at these works, and, on first testing it, were fearful of its strength from a partial leakage. The cylinder of the ram is 4½ inches thick, and 9 inches bore, estimated to be safe at 3 tons per square inch. We shrunk on to the cast-iron cylinder two bands of the best wrought iron, 4 inches broad, and 2 inches thick, and the grip, on cooling, proved its sufficiency, since the piston would not, after the bands were cold, quite pass again through the cylinder.

I long ago suggested to two or three persons in authority in such matters, to make so simple and comparatively inexpensive an application to heavy guns and mortars. But things very learnedly theoretical, and very decidedly unpractical, seem to be preferred—witness the very curious and cleverly devised 3 feet mortars of concentric wrought-iron shells, lately made at an enormous cost, and of little or no value. Witness, too, the pains taken by certain correspondents of yours, and others, to heap up a refinement of theories to bring about exactness of tension on guns made of longitudinal and concentric pieces. Now, not a bit of this is needed in practice; for it is entirely on the normal or inherent elasticity of the iron that the effect depends, and which seems to be little understood.

If we stretch a bar of good wrought iron to about 10 tons per inch (very good will take 12 tons), we shall find the stretch of nearly one-eighth of an inch in 10 feet will practically return. This, then, is the normal elasticity of the metal, and it is nearly a constant quantity. So when a ring is shrunk on hot, the ultimate effect or grip of the whole will be limited to the above natural result, neither more nor less; and the inner and outer portions of the band will accommodate themselves in accordance with it. A high degree of heat is useless, and so also is a band, or still worse, a number of bands, not of substance corresponding to these parts.

In my humble opinion, the few attempts that have been made on ordnance have failed from want of knowledge of, or due attention to, the foregoing particulars.

I am, Gentlemen, yours, &c.,

THOMAS HOWARD.

King and Queen Iron Works,
Rotherhithe, Dec. 1, 1857.

MEASURING THE DEPTH OF THE SEA.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I think that this might be done in the following manner, and it would be effectual when the depth could not otherwise be measured; but I am afraid that it would not answer except when the sea is calm.

Provide a number of small hollow balls, according to the soundings required, made of earthenware or other similar and convenient material. When the depth is required, let one down, noting the time of so doing, and also that when a globule of air reaches the surface.

The balls might be of various thicknesses, and should be chosen according to the probable depth, so as to be strong enough to pass through the water without breaking, and yet sufficiently thin to break upon striking the bottom, when the air contained in them will, of course, rise to the surface. It may be that differences of thickness would not be necessary.

It should be known at what rate a body descends in water, and also how fast a globule of air rises, both of which could be determined by experiment.

I am, Gentlemen, yours, &c.,

J. A. D.*

THE DRAINAGE OF LONDON.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The letter of Mr. Lipscombe, in your last, is a series of assumptions. What right has he to assert that any tunnel tube I propose is to be always open at its terminal, and what further right has he to adopt the apocryphal account of a periodical which departed so completely from the right line of truth and journalism as to misrepresent the name of the author of the communication to which he alludes? In brief, I beg to say that neither in any periodical nor to the commissioners of sewage have I submitted the working details of my plan; *ergo*, what can be the value of Mr. Lipscombe's conclusions? I have only to repeat, that I proposed, in 1856, to do by pneumatic power what Mr. Lipscombe, in 1857, proposes to do by hydraulic power, which latter, if I am not mistaken, has already been applied (though

* This letter included certain calculations which were unsound.—EDS. M. M.

it may not have been patented) in connection with sewage economy.

I am, Gentlemen, yours, &c.,
C. M. Archer.

Dec. 8, 1857.

RAILWAY GUARD AND PASSENGER SIGNALS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—Colonel Yolland, R.E., having arrived this morning at the Tilbury Railway Station, by direction of the Board of Trade, to examine my railway passenger signal, the directing tube having been tied on one side of a door handle of a carriage, and a piece of flat iron placed 8 inches under it, when the train was in full speed between Tilbury and Grays, I took the signal from my coat-pocket and allowed it to shoot down the tube by its own gravity, when it exploded on the iron plate with a loud report; but as the charge of powder in the signal was only 12 drachms, the colonel, who was in the rear end of the train, did not hear the report, while the other gentlemen who were in the front part of the train did hear it. All that is now required is to insert a charge which will produce a report to be heard the whole length of the train. The requisite charge can be ascertained after a few more experiments; besides, if the different carriages were furnished with one or two signals each, the word or report could be passed on by every second or third carriage. By using a wooden plug instead of a cork for confining the charge, the report will be much louder. The bottom of the chamber for the charge is fortified with a disc of sheet iron, and the steel pin may have a second percussion cap on its inner end; this will insure a more perfect ignition of the charge. In addition to the sharp report of the signal, there is the vivid flash and a cloud of thick smoke to enlist the eye as well as the ear of the guard and driver of the engine. It is more convenient to have the signal ready capped with a safety cover over the percussion cap, which cover can be taken off in an instant when the signal is to be used.

I am, Gentlemen, yours, &c.,
J. Norton.

Rosherville, Dec. 1, 1857.

SCIENTIFIC DISCUSSION.

[Mr. Cheverton considers it desirable, notwithstanding our statement last week, to publish the following remarks.]

To the Editors of the Mechanics' Magazine.

Gentlemen,—Being content to encroach very slightly upon your space, I may perhaps be allowed to inform C. W. M. that the sentence which he quoted and criticised in your Magazine for Nov. 7, was connected by the word "still" with the preceding sentence, in which the *varying* velocities of identically the *same* vessel were spoken of, which, therefore, both logically and grammatically, continued to be the condition of what was further predicated. If he erroneously understood it subject to any other condition, then *to him* the sentence was "unquestionably erroneous," but not otherwise. As to the influence of form and construction on the relation between steam power and such varying velocities, that is too large a subject to be again incidentally noticed, but a *variable* relation there certainly is.

I am, Gentlemen, yours, &c.,
Benjamin Cheverton.

THE ATOMIC ARRANGEMENT OF FLUIDS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—"J. A. D." who writes in the *Mech. Mag.*, No. 1790, would do well to reconsider this subject, as he only views the atoms as existing in one plane. He also takes water as an example. This, I think, inadmissible, as water is a compound fluid, and we know not if the atoms of its component gases be of the same volume. In a few days I will send you a plan of an atom-meter, which I have invented. Permit me in this to say, that equal volumes of any two homogeneous fluids contain the same amount of matter, and therefore that the difference of gravity of any two fluids, whose particles are in contact, is not due to a difference in the quantities of matter, but a difference in the bulk of their respective atoms.

I am, Gentlemen, yours, &c.,
Wm. Carroll.

Openshaw, Manchester,
Sept. 7, 1857.

SIMPLE EFFLUVIA TRAP.

To the Editors of the Mechanics' Magazine.

Gentlemen,—A good contrivance of this sort for sinks and other places can be effected by simply placing a valve opening downwards in the waste-water pipe. This will open upon the descent of water, and afterwards closing, will prevent any effluvia from finding its way into the kitchen, or wherever the trap is placed.

I am, Gentlemen, yours, &c.,
J. A. D.

FIRE-PROOF SAFES.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—A paragraph having appeared in the newspapers stating that, in the fire at Fleetwood, the contents of a Milners' safe "had been destroyed" we immediately sent over to investigate the matter, and found that the papers, instead of being in a Milners' safe, as represented, were contained in a tin box, certainly bearing our name, but of a very much lighter quality, with a single chamber, 1 inch (the present make being near 3 inches), made many years ago, and purchased second-hand by the parties using it, some seven or eight years back, and as different from our present make of safes and chests as one thing can be from another. The gold melted, and the notes destroyed, were in a mahogany drawer in the bed-room.

The paragraph in question has evidently been concocted by some interested and dishonest party, purposely and knowingly misrepresenting the facts.

We are, Gentlemen, yours, &c.,

THOMAS MILNER & SON.

Phœnix Safe Works,
Liverpool, Dec. 8, 1857.

MISCELLANEOUS INTELLIGENCE.

MACHINERY FOR PRINTING IN COLOURS. —Messrs. H. and E. T. Dolby, of Regent-street Quadrant, London, have patented the following arrangement of machinery for printing in colours:—The printing blocks or surfaces are fixed to a table or frame, having on the sides rails for guiding a carriage from end to end of the machine. The paper to be printed is placed around a roller, carried by a carriage, which is moved to and fro on the rails by means of an endless band or chain, in such manner that the roller may roll correctly without slipping over the succeeding blocks, and so as to receive an impression from each of the blocks. The arrangement of the apparatus at the ends of the table and on the roller is such that the paper is, after receiving the impressions, delivered from the roller, and a fresh piece is then placed thereon. In order to supply colour to the blocks as many colour apparatuses are used as there are blocks, and each consists of a trough containing the colour in which a roller revolves, having a suitable doctor or scraper; this roller at its upper surface delivers colour to an endless apron of vulcanised India rubber carried by two rollers. The endless apron passes over a table on which there is an inking roller, which at intervals is moved over the apron on the table, and then over its block or printing surface. The several blocks or printing surfaces may, if preferred, be fixed on a cylinder instead of a table.

THE BOILERS OF THE LEVIATHAN.—During the discussion on Mr. Apsley Pellatt's paper on the Smoke Question, which took place at the Society of Arts last week, Mr. C. Wye Williams spoke as follows of the boilers of the *Leviathan*:—He said they presented the greatest violations of natural and chemical laws that he had ever witnessed. He defied them to burn coal in the furnaces without great waste of fuel and enormous evolution of smoke, and they must use anthracite coal. The same remark applied to the *Great Britain* steam ship. Each double boiler of the *Leviathan* contained twelve furnaces, and about 400,000 cubic feet of atmospheric air per hour was required for proper combustion of the gases alone; but how was the air to get into the furnaces? It really seemed as if the utmost pains had been taken to exclude the air; and to say that the air could be supplied through the fuel on the grate, was to say that a man could breathe the air which came from the lungs of another person.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

BANKS, W. and J. *Certain improvements in machinery or apparatus to be employed for washing, scouring, or bleaching cotton, linen, and other textile fabrics.* Dated Mar. 21, 1857. (No. 793.)

This invention consists in certain machinery for bleaching or washing the goods or fabrics, by exhausting the air from a chamber in which they are placed, and then saturating them with water or other bleaching or cleansing liquid.

PERROTT, G. *Improvements in horse gearing.* Dated Mar. 21, 1857. (No. 795.)

The patentee claims—1. Firmly fixing the main central vertical shaft to the bottom of the case, cylinder, or foundation of the machine, so as to render it incapable of motion. 2. Uniting the central spur pinion with the large bevel wheel, so that both may be made to rotate together around the fixed central vertical shaft.

COLE, J. E. *Improvements in the rig and working the sails of square sail vessels.* Dated Mar. 21, 1857. (No. 799.)

This invention cannot be described without engravings.

CROOKER, M. A. *Improvements in paddle wheels.* Dated Mar. 21, 1857. (No. 800.)

This invention cannot be described without engravings.

BLACKBURN, B. *Improvements in the ma-*

nufacture of pens. Dated Mar. 21, 1857. (No. 804.)

This consists in forming each pen of two pieces of glass, set in a frame of metal, so that the flexibility of the frame will admit of the points of the glass pen expanding and contracting when writing.

HEAD, T. H., and J. WRIGHT. *Improvements in casting railway chairs, and in the manufacture of other castings.* Dated Mar. 21, 1857. (No. 805.)

In the method of moulding such castings in ordinary use two difficulties arise, one being the labour required in moving the boxes from one operation to the other, and another the labour required in turning them over. By an arrangement of machinery these difficulties are here obviated. The invention cannot be clearly described without engravings.

HYDE, E. *Improvements in the manufacture of fabrics from products of the husks of cocoa-nuts.* Dated Mar. 21, 1857. (No. 806.)

Here the sheets of cocoa-nut fibres are produced by cementing cocoa-nut fibres together by bituminous cements, such as Stockholm pitch and tar, also by resinous, and oily, and soap cements. To give body and surfaces to such sheets of fibres the pulp or dust of the cocoa-nut husk is made to adhere by cement.

DOLBY, H., and E. T. *Improvements in machinery used when printing several colours in succession on the same surface.* Dated Mar. 21, 1857. (No. 807.)

This invention is described at page 566 of this number.

HEAP, W. *Certain improvements in self-acting slide lathes.* Dated Mar. 23, 1857. (No. 809.)

This invention cannot be described without engravings.

SHERAR, J. *Improvements in oil and spirit lamps, by the formation of burners obviating shadow.* Dated Mar. 23, 1857. (No. 811.)

The outer part of the burner is made of a conical shape, and at such a distance from the flame as to allow the rays of light from the flame passing beneath as well as above this outer part, and without throwing any shadow therefrom below or round the lamp. The glass may be supported on a narrow rim, at the lower end of this outer part of the burner.

SMITH, J. *An improvement in applying steam or other aëriform fluids expansively in engines.* Dated Mar. 23, 1857. (No. 814.)

This consists in the use of an expansion chamber, in conjunction with every two cylinders in a series of cylinders, so that the steam in passing from any one cylinder to another shall pass through and become accumulated in the expansion chamber.

SMITH, T. M., and C. BURKE. *Improvements in the preparation of materials applicable to the manufacture of candles.* Dated Mar. 23, 1857. (No. 815.)

This consists of mixing resin with tallow, palm oil, and other oily and fatty matters, and then acidifying such compounds.

BARANOWSKI, J. J. *An improved method of, and apparatuses for, signalling upon railways.* Dated Mar. 23, 1857. (No. 816.)

The object here is, to prevent collision on railways. Signals are placed along the line, acted upon each in turn by the passing train, and set to indicate "danger," and by a connection between the signals the signal which has been last before set to indicate "danger" is replaced to indicate "safety;" thus the signals are worked in pairs, the signal next behind the progressing train always indicating "danger" to a train following on the same line. The apparatus for communicating motion from the passing train to the signals may consist of a lever with inclined surface, so placed that the flanges of the wheels of the train will depress it, and so connected with the signals that the motion will take effect as desired, not only on the signal to be set to "danger," but on the signal which is to be set to "safety."

JONES, F. J. *An improved buckle or fastening.* Dated Mar. 23, 1857. (No. 817.)

The inventor forms the lower bar of a buckle in the shape of an apron, and makes a slot therein to receive a metal connecting piece formed of a head with a neck, which neck is made to terminate in a loop. To or through this loop are passed brace ends, &c., to which the buckle proper is attached. The head of the metal loop is turned, to be inserted in the slot in the buckle flap.

COLLYER, R. H. *Improved machine for cleaning and purifying wheat and other grain.* (A communication.) Dated Mar. 24, 1857. (No. 819.)

This consists in the mode of treating moist grain to remove the hull from the kernel, &c., upon the principle of causing one grain to be rubbed against another by moving them between the surface of two cylinders. Also in constructing both the external stationary drum and the internal revolving cylinder, with a surface full of small openings for allowing the hulls, dust, &c., to pass out, and for admitting a current of external air.

FOX, S. *Improvements in hardening and tempering steel wire, and in straightening wire.* Dated Mar. 24, 1857. (No. 824.)

The untempered wire is caused to pass continuously while in a state of tension between plates heated to redness, and then through a vessel containing a cold liquid, or between cold plates, by which it is chilled

and hardened. Afterwards, it passes between other plates, heated to the degree necessary to bring the wire down to the required temper. For straightening wire, it is passed when in a state of tension between plates heated to redness, and is afterwards chilled.

LAWES, T. *An improved construction of agricultural implement to be used in tilling the land.* Dated Mar. 24, 1857. (No. 825.)

This consists in the tine cylinder being supported horizontally on running wheels, mounted eccentrically upon the outer ends of the shaft on which the cylinder revolves, so that by the employment of ordinary screw and pinion gear in connection with the framing the cranks on which the wheels are mounted may be actuated in either direction at pleasure.

OUDRY, C. F. L. *Improvements in the preservation of articles of cast, wrought, rolled, and forged iron, zinc, and other metals or alloys of metals against oxidation from humidity and other destructive effects of air and water.* Dated Mar. 25, 1857. (No. 826.)

This consists in depositing, by electricity, copper in a pure state, upon metal, after first being coated with a composition serving as an isolating and metallising medium.

COLLINS, W. H. *Improvements in attaching knobs to spindles.* Dated Mar. 25, 1857. (No. 827.)

This invention cannot be described without engravings.

LAWES, T. *A machine or apparatus to be used in cleansing, purifying, and drying animal and vegetable substances.* Dated Mar. 25, 1857. (No. 828.)

This consists in an apparatus of cylindrical form, within the centre of which a shaft (furnished with beaters or stirrers) is caused to revolve, so that the article within the body of the apparatus may be first thoroughly stirred or dusted by the rotary action of the stirrers, and subsequently cleansed by the admission of steam. Drying is effected by a case surrounding the apparatus which is kept charged with steam.

HEWETT, J. *Improvements in sewing-machines.* (A communication.) Dated Mar. 25, 1857. (No. 831.)

This has reference to two previous patents, and consists chiefly in the needle neither being turned on its axis nor moved laterally, but having merely an up-and-down motion.

HILL, P. *Improvements in machinery for stamping, marking, or printing and arranging papers, letters, and other articles.* Dated Mar. 25, 1857. (No. 832.)

The letter (say) is introduced into the machine, its position being regulated by a stop or gauge, and the stamp supplied with ink is pressed upon the letter. The letter is carried by fingers to a trough, into which it is forced by a plunger, or by fingers, which propel forward the column of letters as they accumulate. When the column is propelled into an inclined trough a plate serves to press them into the trough, and prevents their shuffling out. The letters are counted by a self-acting counting apparatus, which only acts when a letter is placed in the machine, and ceases to act when no letter is introduced.

NEWTON, A. V. *An improved construction of water meter.* (A communication.) Dated Mar. 25, 1857. (No. 833.)

This invention cannot be described without engravings.

SIMS, R. *Improvements in machinery or apparatus for cutting hay, straw, and other similar substances.* Dated Mar. 25, 1857. (No. 834.)

The patentee uses two arms, and two knives. One of the knives is attached to a frame segment which can be removed from the arm or fixed to it as required. By removing the segment and knife the machine is adapted for long cuts or litter, there being one cut instead of two to the feed. He also places on the main shaft a clutch box, by the sliding or reversing of which into different gearing he can alter the speed of the feed rollers, and vary the length of cut.

HENDERSON, J. *Improvements in the manufacture or production of plain and figured fabrics.* Dated Mar. 25, 1857. (No. 836.)

This relates to an invention for which a patent, dated 16th Dec., 1851, was granted to F. W. Norton. In Mr. Norton's arrangement the printed pattern warp threads were laid over foundation warp threads by a system of cross weaving, so as to produce a full or close covered warp surface on the fabric; but here the foundation warp threads are dispensed with, their place being supplied by stationary longitudinal wires or cords, such wires or cords being fixed behind the healds or heddles and passed through them, and also through the dents of the reed.

SOMERVAIL, W. *Improvements in the treatment or preparation of fibrous materials for being spun.* Dated Mar. 25, 1857. (No. 837.)

This is particularly applicable to the treatment of the woollen fleece as it leaves the wool carding engine. As the fleece is doffed by a single doffer from the cylinder it is cut up longitudinally by a set of self-acting shears, worked by the carding engine into as many strips as there are rovings to be made. Immediately after quitting the shears, the separated strips are

passed between a corresponding set of endless upright crossed belts, so arranged as to catch the individual strips and twist them up into rovings.

CASSELS, R., and T. MORTON. *Improvements in the manufacture of iron.* Dated Mar. 25, 1857. (No. 838.)

According to this process, the pig iron to be refined is melted down in a cupola, with certain slags used in fluxing the metal, and the melted product is run from the cupola into a refinery having six or more tuyeres.

COWPER, C. *Improvements in the manufacture of shot and shells for rifled ordnance.* (A communication.) Dated Mar. 25, 1857. (No. 839.)

The shot or shell is made of an elongated form, and is cast with rings of larger diameter than the bore of the gun. These rings are afterwards turned to fit the bore. The shot is also cut with ribs which are a little larger than are required to fit the grooves in the gun, and these ribs are afterwards planed by a machine to the proper size and twist.

ALLAIRE, S. M. *Improvements in manufacturing hats, caps, and bonnets.* Dated Mar. 25, 1857. (No. 840.)

The patentee makes the shapes or bodies of knitted web cotton tissue, &c., to which he gives the form by preparing it with gum lac dissolved, and moulding it on metal blocks or forms.

WILSON, J. W. *Improvements in the cutting tools used for rounding, surfacing, or otherwise operating on wood.* Dated Mar. 25, 1857. (No. 841.)

The gouge is formed of a tube of steel, and the patentee bevels the ends from the outside to form the cutting edge all round. The chisel for smoothing is formed of a disc of steel, bevelled all round on one side to form the cutting edge. The advantages of these tools are, that a great extent of cutting edge is obtained, and so that by turning them round a little a keen edge is always presented.

RADCLIFFE, J., J. FEARNEHOUGH, and J. MATHER. *Certain improvements in index machines applicable to looms for weaving.* Dated Mar. 26, 1857. (No. 842.)

This consists in machinery for giving up-and-down motion, in addition to the usual to-and-fro motion, to the cylinders of index machines, in order to vary the pattern produced in the loom.

CLARK, W. T. *A portable metallic spring mattress.* Dated Mar. 26, 1857. (No. 845.)

This consists in forming the mattress of metal, without any stuffing or covering. A lattice work of metal laths constitutes the resilient surface of the mattress, upon which any light thin stuffed mattress may be laid.

WHITE, G. *Improvements in glass-furnaces.* (A communication.) Dated Mar. 26, 1857. (No. 846.)

This consists in heating glass houses or furnaces for the manufacture of glass by the complete combustion of the gases derived from wood, coal, &c., the full combustion taking place by means of a blast of hot air, the injection being so regulated that the full combustion of the gases, and consequently the highest temperature, takes place in the central part of the furnace towards the melting pots. By this process the degree of heat in the furnace may be regulated with precision.

TOMASINI, D. *Improvements in the construction of easy chairs and chamber commodes.* Dated Mar. 26, 1857. (No. 847.)

This relates—1. To the application of a spring to the back of the chair, so that it may be made to support the lumber region of the back of the person seated, thereby affording rest to an invalid. This may be effected by the application of either vulcanized India-rubber or metallic springs. It relates—2. To a mode of adapting a night convenience to an easy chair, the object being effected in such a manner that neither the pan nor any of its appendages can be seen.

MORRIS, J. *Certain improvements in connecting the rails of railways.* Dated Mar. 26, 1857. (No. 852.)

This consists in providing in the sides or channels at each end of each rail a hole, into which a piece of iron is driven, which then projects on each side of the rail, and has the ends thereof slotted. When two lengths are brought end to end together, a screw bolt is placed on each side of the rail in the slots, such screw bolt having a right handed thread at one end and a left handed thread at the other, on which screw nuts are placed.

WHITE, G. *Improvements in weaving.* Dated Mar. 26, 1857. (No. 853.)

This relates to an adaptation of machinery to relieve the yarn in the loom from unnecessary strain. It consists in making the yarn beam turn forward by the action of machinery, so as to make the delivery of the yarn meet the strain to which it would otherwise be exposed by the lateral deflection of the yarn in shedding, and to tighten the yarn again as it may require, either by the resilience of the yarn beam alone, or conjointly by the forward motion of the cloth beam as the stroke of the lathe is being given, or without the resilience of the yarn beam.

LÖWENSTEIN, E. V. *Improvements in the construction of ovens for the manufacture of coke.* Dated Mar. 27, 1857. (No. 855.)

The oven is of brickwork, open at the top.

the walls lined with fire-bricks having flues which may be separate or all leading to one chimney. Horizontal flues are used without covers, and leading at each end to the flues in the walls or chimneys, and through the said walls. A wooden pole is tapered, and of sufficient length to protrude at each end through the oven when placed in the uncovered flues. After the oven is charged the top is covered by a layer of clay, and the poles drawn out; the coal in the apertures thus formed is ignited, and the flues are left opened or closed as desired.

SPURR, E. A. *Improvements in fire-places, chimneys, and stove grates.* Dated Mar. 27, 1857. (No. 858.)

In constructing a new fire-place and chimney, the patentee builds the fire-place from 18 ins. to 3 ft. in height, and then throws an arch over through the whole thickness of the wall, leaving an opening in the crown of the arch. Upon this he builds in brickwork a funnel-shaped pipe, rather larger in diameter at the bottom than at the top. At the bottom of the flue and immediately above the stove-grate, he places a register plate or valve of peculiar construction. This plate may be built into the chimney. He also constructs pipes or flues in the walls, ceilings, or floors of the room, and connects them with the smoke flue so as to supply air to the room and the fire, and provide for the escape of the used or vitiated air.

MARTIN, C. *Improvements in working signal apparatus on railways.* Dated Mar. 27, 1857. (No. 861.)

Along the lines of railways are arranged pipes which contain fluid, and to each signal apparatus is applied a pump which communicates with the two ends of the two lengths of pipes which respectively communicate forward and backward to two signal stations. The pump has suitable apparatus connected therewith to enable the passing train to actuate it, so that the engineman and guard of a train on coming towards a signal will at once ascertain whether the preceding train has passed the next signal station.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

LAFONE, H. *Improvements in tanning.* Dated Mar. 21, 1857. (No. 794.)

Here the skins are first fleshed and unhaired; they are then placed in a vessel containing the tanning liquor, and are there subjected to a hydrostatic pressure of from three to four hundred weight per square inch, produced by a hydrostatic pump. This pressure is allowed to remain for some few hours, when the skins are passed through rolls, in order to remove the watery particles.

HEMMING, S. *A new or improved material for roofing or other building purposes.* Dated Mar. 21, 1857. (No. 796.)

This consists in forming from pulp produced from the fibres of straw, grass, hemp, &c., plain, figured, or corrugated surfaces of material, by causing it to be placed within dies or moulds corresponding, until sufficiently dried and hardened (by pressure or otherwise) for removal, the surfaces being subsequently rendered impervious to moisture.

BROOMAN, R. A. *An improved method of driving the spindles of spinning frames.* (A communication.) Dated Mar. 21, 1857. (No. 797.)

This consists in making grooves round the circumference of the drum, and in carrying an endless belt entirely round it, and round one or more pairs of spindle wharves, one wharve and spindle of each pair being to the left, and the other to the right of the drum. Supposing each endless belt to drive three pairs of spindles, and that there are five such belts round the same driving drum, then one drum will drive simultaneously thirty spindles with great regularity, and all at the same speed.

GUNTHER, G. J. *Improvements in preparing blocks and stones for building purposes.* Dated Mar. 21, 1857. (No. 798.)

The blocks are moulded so that only four sides form plane surfaces, the upper and lower side forming two inclined planes, which converge towards each other from the edges to the middle, so that the direction of the furrow which is formed by the two inclined planes on the upper side, forms a right angle with the direction of the furrow which is formed by the two inclined planes on the lower side. The blocks are dovetailed together crosswise at right angles. The inventor forms another block having grooves on the opposite sides, and at right angles to one another. Stones thus shaped are held together without cement.

MUSHET, R. *Improvements in the manufacture of cast steel.* Dated Mar. 21, 1857. (No. 801.)

The inventor adds to deoxidised iron ore, when heated (with or without an admixture of carbonaceous matter) to such a temperature as will reduce or melt the metal, a triple compound consisting of iron, manganese, and carbon, also treated in a similar manner, and after the deoxidised iron ore and triple compound have been melted and blended together, he pours the metal into moulds.

MUSHET, R. *Improvements in the manufacture of cast steel.* Dated Mar. 21, 1857. (No. 802.)

For improving the quality of cast steel, as well as preventing injurious action upon vessels employed in making it, the inventor adds to the molten cast steel, or to the materials from which it is produced, a compound consisting of iron, carbon, and manganese, in a molten state.

HEMMING, F. S. *Improvements in the mode of treating peat, mixed or not mixed with other vegetable or animal fibrous substances, and in the application of the same to various purposes.* Dated Mar. 21, 1857. (No. 803.)

The inventor mixes peat with other fibrous material, and then with oil, resin, tar, India-rubber, and gutta percha. The effect is to produce a viscous tough mass, which, being put into moulds, is subjected to pressure, and allowed gradually to cool. He renders it uninflammable by impregnating it with metallic salts.

NORMANDY, L. A., jun. *An improved process for manufacturing iron.* (A communication.) Dated Mar. 23, 1857. (No. 808.)

By this process malleable iron is to be produced directly from fluid crude iron, by running it into a common puddling furnace. The furnace being previously heated, a blast of air is directed into a central chimney through tuyeres; crude iron in a molten state is then run from the blast furnace, and conveyed near the top of the central chimney, where it is poured in in small streams. Whilst falling down it is permeated on all sides by the blast, and thus purified. When enough molten crude iron has been poured in for making a bloom, the blast is stopped; the chimney is then covered by a lid, and the puddler gathers the iron on the bed of the puddling furnace to form a bloom, to be squeezed and forged in the usual way.

NUTTALL, T. *An improvement or improvements in machinery for preparing cotton, flax, wool, or other fibrous materials.* Dated Mar. 3, 1857. (No. 810.)

This refers to presser flyers which act by centrifugal force. At the upper part of the leg of the flyer the inventor fixes a staple through which works a clip which passes round the leg of the flyer, and which has on it two catches which limit the motion of the presser, so as to prevent its opening too far or closing too much. The staple and clip operate so as to form a support to the presser and its appendages, by which the necessity of collars at the bottom of the leg are dispensed with.

ROWLAND, E. *Certain improvements in steam engines.* Dated Mar. 23, 1857. (No. 812.)

This consists in substituting, in lieu of the circular steam cylinder, a chest, box, or chamber, having rectangular sides and ends, in which works a piston of a longer or more continued form than usual, so as to slide parallel within the steam chamber. The square or oblong cylinders occupy very little space.

MILLS, W. *Improvements in the action of upright pianofortes.* Dated Mar. 23, 1857. (No. 813.)

Here the action of the check and of the damper is derived from the sticker by a lever having its fulcrum or axis on a fixed rail, attached at one end by a pin joint to the sticker. At the other end the lever has attached to it the lower end of the check wire, there being an adjusting nut at the end of the wire to adjust the distance from the string at which the hammer shall be checked. Between the sticker and the fulcrum of the lever the lower end of the damper wire is attached; hence, when the sticker is raised it will, by giving motion to the lever, move the check into position and remove the damper from the string.

CHASTAGNON, M. *Improvements in tuyeres for blast furnaces.* Dated Mar. 23, 1857 (No. 818.)

The new tuyere is composed of two cast-iron concentric cones, connected at their smaller ends by a piece cast with them, so as to form one piece. A moveable plate is fixed on the larger ends, and in which are placed two holes for the induction and eduction of the water.

TANGYE, J. and J. *A new or improved lifting-jack.* Dated Mar. 24, 1857. (No. 820.)

This is a hydraulic jack, and consists of a cylinder open at both ends and closed in the middle. The piston is stationary, and is fixed on the base of the instrument. One of the compartments of the cylinder rises and falls upon the piston. The upper compartment constitutes a reservoir from which the liquid is transferred by a pump to the lower cylinder, and the said cylinder thereby raised. The inventor prefers to employ oil instead of water in the improved jack.

ZIBELIN, J. A. *Improvements in the fabrication of artificial wines, brandy, and vinegar.* Dated Mar. 24, 1857. (No. 821.)

A liquid wort is composed of water, sugar of glucose, cane, beetroot, or other sweet matter, bitartrate of potassa, tan, the bark of oak, or yeast of beer, in several proportions. The wine may be coloured, or remain white.

HALL, T. Y. *Improvements in steam gauges and water indicators.* Dated Mar. 24, 1857. (No. 822.)

This invention relates to a sort of water-box gauge, whereby enginemen are enabled to ascertain at any time the quantity of water in a boiler, without having recourse to cocks, water gauges, floats, &c.

NEWTON, A. V. *Improvements in carding engines.* (A communication.) Dated Mar. 24, 1857. (No. 823.)

This relates to the application of strippers to the main cylinders of carding engines in connection with a doffer, which, as the cotton is stripped off the cylinder, instantly returns it as fast as it is taken off by the stripper, whereby an uninterrupted carding action is preserved, and a comparative evenness of lap is secured.

MICKLE, J. *Improvements in machinery or apparatus for reaping and mowing.* Dated Mar. 25, 1857. (No. 829.)

In this machine knives or scissors are worked by means of pinions on the axle, giving motion through rods to four levers, forming a rhomb, the angles of which alter as the rods reciprocate.

EARLY, G. D., and J. W. EDMONDS. *A method of producing glass designs, figures, and patterns.* Dated Mar. 25, 1857. (No. 830.)

This consists in forming in stained or other glass certain parts in any colour, which parts being brought together produce the required design.

HENDERSON, J. *Improvements in writing instruments.* Dated Mar. 25, 1857. (No. 835.)

This relates to reservoir pens. The handle of the pen forms the ink reservoir, and at the upper end of it is a small hole for the admission of air. The bottom end of the holder has in it a minute lateral aperture for the passage through of the ink. This part of the holder contains a few threads of silk passing through the ink duct, and through a hole in the pen, so as to reach the back of the pen. With this arrangement the ink is safely retained in the holder whilst it flows freely to the pen.

LANE, U. *An improvement in the transmission of motive power.* Dated Mar. 26, 1857. (No. 843.)

This invention cannot be described without engravings.

BAKER, C. H. *Railway passengers' signal alarum.* Dated Mar. 26, 1857. (No. 844.)

This consists in fixing a bell partly inside a box and placing the box outside the carriage. The bell can be rung or struck from the interior of the carriage by mechanical appliances, which at the same time cause a connecting-rod to rise above the bell about six or eight inches high, and a ball or other signal being attached to it, the guard of the train can tell which carriage the ringing proceeds from.

BENOIST, J. J. C. *A new method of applying marks on paper for postal purposes.* Dated Mar. 26, 1857. (No. 848.)

This consists in the application of a stamp to every sheet of paper, or the envelopes for letters, so that every such sheet or envelope will indicate the weight of postage.

BUTLER, A. F. *Improvements in machinery for pulping coffee.* Dated Mar. 26, 1857. (No. 849.)

The machine consists of two rollers grooved longitudinally, and revolving near each other. Between the rollers are placed blocks, at equal distances apart, being attached at their upper ends to a bar passing from side to side of the machine. In between the two rollers another bar passes from side to side, and this bar fills the space between the rollers, except at certain places where it is notched away, and one of these notches comes under each block. The coffee is fed by a feeding roller between the blocks, and in passing between the rollers has a portion of the skin removed, but it is prevented by the bottom bar from at once escaping, and has first to traverse sideways until it arrives at one of the notches in this bar, and by this time the whole of the skin is removed.

CLARK, J. L. *Improvements in lighting coal mines.* Dated Mar. 26, 1857. (No. 850.)

This consists in causing a current of air under pressure to pass through the lamp, so as to exclude fire damp from it.

PALMER J. J. *Improvements in the construction of steam boilers.* Dated Mar. 26, 1857. (No. 851.)

This consists in so forming a boiler, and in so shaping and placing the flues therein, that an increased quantity of heat shall act upon a small quantity or surface of water, and in such a part of the boiler as to cause the water to be constantly thrown upon the hottest parts of the boiler, where steam will be generated the fastest, and also keep the entire water in the boiler in continual circulation.

RUALEM, F. *Improvements in railway brakes.* (A communication.) Dated Mar. 26, 1857. (No. 854.)

According to this invention the carriages are fitted with a set of skid brakes at each end of the carriage. Each brake consists of a curved metal strap, hinged above the centre of the wheel to the carriage framing. The lower end of the strap is fitted with a shoe, which, upon being released, enters below the wheel, and consequently stops its rotation. The brakes are released to fall into action by chains and segments relieving a spring catch.

DELON, A. *An improved mould for the manufacture of buttons.* Dated Mar. 27, 1857. (No. 856.)

The matrix is formed of two circular pieces of metal. The inner piece is adjustable by a set screw and groove. The die is composed of four circular pieces of metal fitting one in the other, two being furnished with shoulders. These pieces are adjustable by set screws and grooves. The faces of the die and matrix are so formed

that, when the bottom plate of the button is inserted, and pressure applied, the closing of the button is effected.

HOCHSTETTER, E. *The employment for motive purposes of sulphuret of carbon, an agent not hitherto so used.* (Partly a communication.) Dated Mar. 27, 1857. (No. 857.)

This consists in the employment of the vapour of sulphuret of carbon as a motive agent. The inventor prefers to obtain the vapours in a generator, the whole surface of which should be covered with water.

SUGDEN, G., and J. BRIGGS. *Improved machinery for weaving checks or figured fabrics.* Dated Mar. 27, 1857. (No. 859.)

Here the pattern is produced by means of weft threads of divers colours, which are thrown into the shed (formed by a partly coloured warp) by different shuttles. The shuttles, one for each colour of the weft, are placed in a rising shuttle box, so as to bring one or other of the shuttles opposite the shed. The number of picks or shoots of any one colour, and the order of succession of the various colours, so as to produce any given pattern, is regulated by a "pattern wheel," which is provided at or near its periphery with a number of moveable segmental pieces.

WARD, J. *Improvements in the manufacture or production of manures or fertilizing agents.* Dated Mar. 27, 1857. (No. 862.)

This relates to the waste iodine or kelp liquor of the iodine maker, which, instead of being thrown aside as valueless, is turned to valuable account, by being discharged into a proper receiver where unslacked lime is mingled with it.

PROVISIONAL PROTECTIONS.

Dated October 15, 1857.

2641. Henry Angelo Ludovico Negretti, and Joseph Warren Zambra, of Hatton-garden, opticians. Improvements in producing graduated scales, and other signs, letters, numerals, characters, and pictorial representations, upon porcelain and other ceramic and enamelled materials, which improvements are applicable to the graduated scales of meteorological and other philosophical instruments.

Dated October 19, 1857.

2676. Benjamin Garvey, of Ashland, United States. Improvements in apparatus for determining position and direction on land and sea.

Dated November 2, 1857.

2780. Nelson Matthews, of Dodworth, near Barnsley, York. Improvements in pumps.

2782. Mathieu François Isoard, of Paris, engineer. Improvements in producing heat and light.

Dated November 3, 1857.

2788. James Mallison, jun., of Bolton-le-Moors, yarn agent. Certain improvements in "gassing" yarn and textile fabrics, and in the apparatus connected therewith.

2790. William Joseph Curtis, of Crown-court, Old Broad-street. Improvements in machinery used for slotting, boring, and surfacing.

2792. Henry Kinsman Sweet, of Northumberland-street, Strand. Improvements in photographic portraits and pictures. A communication.

2796. John Seithen, of Earl-street, City, engineer. Improvements in machinery for cutting cork.

Dated November 4, 1857.

2798. William Fothergill Batho, and Eugene Moritz Bauer, of Salford, near Manchester, engineers. Improvements in machinery or apparatus for drilling and boring metals, and also for cutting key-ways and cotter-holes.

2800. James Murphy, of Newport, Monmouth, civil engineer. Improvements in the permanent way of railways.

2802. Charles Edwards Amos, of the Grove, Southwark, engineer. An improved arrangement of steam machinery for driving rotary pumps.

2804. James Houghton, of Kilburn, watch maker. An improvement in braces.

Dated November 5, 1857.

2808. Henry Bessemer, of Queen-street-place, New Cannon-street. Improvements in treating iron ores.

2810. Henry Beinhauer, of Deutz, Prussia, engineer. Improved machinery for drawing or extracting water from mines, wells, pits, or other deep places, by means of suction.

2812. Heinrich Hochstaetter, of Darmstadt. An improved machine for the manufacture of matches.

2814. Henry Robinson Palmer, of Lambeth, engineer. An improved stamping and endorsing machine.

Dated November 6, 1857.

2816. Robert Ker Aitchison, of New North-street, W.C. An improved break applicable to wheeled carriages.

2818. William Anderton, of Ince-within-Mackerfield, Lancaster, colliery overlooker. New railway chairs.

2820. William Macnab, of Greenock. Improvements in vessels propelled by screw or other similar propellers.

Dated November 7, 1857.

2822. John Fordred, of Stoke Newington, gentleman. Improvements in treating and purifying water.

2824. John Adams, of Queen's-road, Dalston. Improvements in revolver fire-arms.

Dated November 9, 1857.

2826. Peter Brotherhood, of Chippenham, Wilts, engineer. Improvements in boilers and furnaces.

2828. Daniel Stothard, of Lambeth, Joseph Jones, of Southwark, David Jonas and Benjamin Woolf Jonas, both of Spitalfields. An improved ship's block.

2830. John Pinker, of Pease-hill, Hull. Improvements in governors for marine steam engines.

2832. Alexander Parkes, of Bath-row, Birmingham. Improvements in the manufacture of nails.

2834. William Jekin Elwin, of Dartford, Kent, tallow chandler. Improvements in night-lights.

Dated November 10, 1857.

2838. Charles Eugène Lecointe, of Paris, gentleman. A new mode of advertising.

2840. Alexander Parkes, of Bath-row, Birmingham. Improvements in the manufacture of tubes and cylinders of copper and alloys of copper.

2842. Josiah Harrington, of Gloster-place, Brixton-road. Improvements in apparatus for pointing pencils or marking instruments.

Dated November 11, 1857.

2844. Henry Thompson and Samuel Thompson, of Regent-street, pianoforte manufacturers. Improvements in the construction of pianofortes.

2846. John Richard Cochrane, of Glasgow, manufacturer. Improvements in the treatment or manufacture of ornamental fabrics.

2848. Isaac Taylor, of Stanford Rivers, Essex. Improvements in apparatus used in printing calico and other fabrics when cylinders are employed.

2850. Albert John Davis, of George-street, Hanover-square, surgeon-dentist. A protective sandal for bathers, which may also be adapted as an auxiliary for swimmers.

Dated November 12, 1857.

2852. Ebenezer Coleman, of Dudley, Worcester. An improvement in lathes for turning bolts, screws, and other small articles in metal.

2854. Françoise Honorine Felicie Bertrand de Sivray, of Paris. Certain improvements in the construction of bedsteads.

2856. William Picking, of Lambeth, engineer. An improved method of, and apparatus for feeding steam-boilers with water.

Dated November 13, 1857.

2858. William James Gifford, of New Millman-street, Esq. Improvements in the making, reefing, and working of sails, and in the construction and arrangement of masts, spars, and rigging, for ships and boats.

2860. William John Macquorn Rankine, Doctor of Laws, Regius Professor of Civil Engineering and Mechanics in the University of Glasgow. Improvements in fan-blowers.

2862. Henry Bessemer, of Queen-street-place, New Cannon-street. Improvements in the treating and smelting of iron ores, and in obtaining products therefrom.

Dated November 14, 1857.

2864. George Printy Wheeler, of Abbinghall, Gloucester, paper maker. Improvements in the preparation of materials for the manufacture of paper pulp or half stuff.

2866. John Macintosh, of North-bank, Regent's-park. An improvement in preparing telegraphic wire, which is coated with gutta percha, in order to render it more capable of resisting heat, and in laying down telegraph wires in the sea.

2868. Michael Henry, of Fleet-street. Improvements in electric and galvanic conductors, and in the mode of, and machinery or apparatus for, manufacturing the same. A communication.

Dated November 18, 1857.

2889. John Tinker, of Staly-bridge, Chester, manufacturer. An improved sizing matter.

2891. Frederick Ayckbourn, of Lyon's-inn, Strand, gentleman. Improvements in bird cages.

2893. Adolphe Ambroise Salomon Cohen, of Paris, civil engineer. Improvements in machinery or apparatus to be employed in the manufacture of drain pipes and other like articles from plastic materials.

2895. Major Booth, of Manchester, finisher, and James Farmer, of Salford, engineer. Improvements in machinery or apparatus for stiffening, drying, and finishing cotton, linen, woollen, and other woven fabrics.

Dated November 19, 1857.

2899. Marc Antoine François Mennons, of South-street, Finsbury. An improved washing and drying apparatus. A communication.

2903. Seth Gill, of Liverpool, surgeon dentist, and Henry Newton, of Liverpool, electro-plater. Improvements in obtaining stereoscopic pictures.

2905. William Clay, of Liverpool, iron manufacturer. Improvements in the points, switches, and crossings of the permanent way of railways.

2909. John Clarke, of Shiffnal, Salop. Improvements in the construction of shafts and poles for cabs, omnibuses, and other vehicles.

2911. John Cope, of Birmingham, manufacturer. Improvements in buttons.

2915. Clement Lawrence West, of Rupert-street, Haymarket. Improvements in window sashes. A communication.

Dated November 20, 1857.

2917. Joseph Denton, of Pendleton, near Manchester. Improvements in looms.

2921. Henry Bessemer, of Queen-street-place, New Cannon-street. Improvements in the manufacture of iron and steel.

Dated November 21, 1857.

2923. Thomas Glover, of Upper Chadwell-street, Myddleton-square, manufacturer, and Alexander Bain, of Fetter-lane, electric telegraph engineer. Improvements in electric telegraphs.

2925. Gerd Jacob Bensen, of Christian-street, St. George's-in-the-East, sugar refiner. An improvement in the manufacture of moulded sugar.

2927. Jean Marie Auguste Eugène Fabart, of Paris, manufacturer. Improvements in looms for weaving.

Dated November 23, 1857.

2929. Samuel Riley, of Victoria-terrace, Manchester. An improvement in the preparation of chocolate and cocoa.

2931. John Henry Johnson, of Lincoln's-inn-fields. Improvements in ships' signal lanterns. A communication from H. L. Stevens, of Washington, U.S.

2933. Alfred Vincent Newton, of Chancery-lane. Certain improvements in sewing machines. A communication.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," December* 8, 1857.)

2020. J. King. Improvements in the preparation of peat and peat coke, or charcoal, and in machinery or apparatus for that purpose. A communication.

2024. C. F. Vasserot. An apparatus for moulding candles. A communication.

2037. W. Williams. Improved graving slips for the repairing of ships.

2043. J. Ridsdale. An improvement in ships' scuttles.

2044. F. B. Anderson. A mechanical slow match for submarine or other blasting and mining operations.

2054. G. T. Bousfield. Improvements in apparatus for feeding water to steam boilers. A communication.

2061. T. Till and W. Gardiner. An improvement or improvements in preventing collisions on railways.

2069. W. G. Plunkett. Improvements in the application of new materials to the manufacture of paper pulp, and yarn for textile fabrics, cordage, &c.

2074. S. Coulson. Improvements in preparing solutions for coating with aluminium.

2076. T. Ivory. Improvements in rotary and reciprocating engines.

2079. J. A. Limbert. Improvements in marine steam engines.

2083. T. Forsyth. Improvements in and applicable to slide valves for steam engines. A communication.

2086. T. Markland. Certain improvements in power looms for weaving.

2087. H. Genhart. An improved apparatus for cleaning and sharpening knives, and cleaning spoons and forks.

2091. W. J. Harris. Improvements in the construction of dining and other tables.

2093. R. Coleman. Improvements in implements for ploughing, hoeing, and scarifying land, and in agricultural steam engines used for the traction of such implements.

2094. G. F. Aroux. Improvements in seed drills.

2100. R. A. Brooman. Improvements in circular sawing machinery. A communication.

2101. G. B. Pettit and H. F. Smith. An improved cap or cover for the glasses of gas and other lights.

2106. R. Birch and R. Bradbury. Improvements in machinery and apparatus for clearing and mixing hatters' furs.

2111. C. Iles. An improvement or improvements in the manufacture of thimbles.

2113. W. C. Cambridge. Improvements in press wheel rollers or clod crushers.

2116. S. Botturi. An apparatus and oven for the carbonization and distillation of all animal and vegetable matters.

2117. S. Botturi. The making of moveable chairs and seats of every kind and description, to be called "Botturi's moveable chairs and seats."

2118. T. Lyne. An improved field stile or grate.

2121. S. Botturi. A system of weaving for the manufacture of all kinds of textile goods, viz., shawls, silk stuffs; carpets, knotted or unknotted, single or double faced; gobelins, tapestry, drapery, velvets, damasked linen, and various other articles, by means of a frame which replaces the Jacquard loom.

2149. W. E. Newton. Improvements in pickets for looms. A communication.

2267. W. Harling, J. M. Todd, and T. Harling. Improvements in looms.

2394. T. Robson. Improvements in washing machines.

2513. E. Thompson and W. J. Nicholson. An improvement in railway switches.

2536. J. Dyson, E. W. Shirt, and H. Shirt. Improved straps or driving-bands for machinery.

2675. W. Bentham. Improvements in harmoniums and other similar reed instruments.

2778. J. L. Norton and E. Wilkinson. An improvement in extracting oil and grease from wool previous to its being manufactured into yarn or fabrics, and also when in the state of yarn or fabrics, and in scouring or cleansing such wool, yarn, and fabrics.

2780. N. Matthews. Improvement in pumps.

2802. C. E. Amos. An improved arrangement of steam machinery for driving rotary pumps.

2808. H. Bessemer. Improvements in treating iron ores.

2816. R. K. Aitchison. An improved break applicable to wheeled carriages.

2822. J. Fordred. Improvements in treating and purifying water.

2826. P. Brotherhood. Improvements in boilers and furnaces.

2828. D. Stothard, J. Jones, D. Jonas, and B. W. Jonas. An improved ship's block.

2832. A. Parkes. Improvements in the manufacture of nails.

2840. A. Parkes. Improvements in the manufacture of tubes and cylinders of copper and alloys of copper.

2844. H. Thompson and S. Thompson. Improvements in the construction of pianofortes.

2858. W. J. Gifford. Improvements in the making, reefing, and working of sails, and in the construction and arrangement of masts, spars, and rigging, for ships and boats.

2862. H. Bessemer. Improvements in the treating and smelting of iron ores, and in obtaining products therefrom.

2893. A. A. Salomon-Cohen. Improvements in machinery or apparatus to be employed in the manufacture of drain pipes and other like articles from plastic materials.

2911. J. Cope. Improvements in buttons.

2921. H. Bessemer. Improvements in the manufacture of iron and steel.

2928. T. Glover and A. Bain. Improvements in electric telegraphs.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2557. George Fergusson Wilson and John Chase Craddock.
2571. James Edward McConnell.
2594. Nathaniel Johnston.
2624. Samuel Fisher.

LIST OF SEALED PATENTS.

Sealed December 4, 1857.

1572. Victor Blumberg.
1588. James Morris.
1590. Thomas George Shaw.
1594. Edward Hirst Hudson.
1597. Edward Edwards.
1626. Maxwell Miller.
1628. Thomas Humphrey Roberts.
1632. Etienne Lemoine.
1734. Lambert Cowell.
2034. Julius Schönemann.

Sealed December 8, 1857.

1601. Donald Bethune.
1604. John Bickford.
1613. Richard Archibald Brooman.
1618. George Mumby.
1623. James Brown.
1629. George Sampson, Joseph Sampson, and Elijah Ledger.
1638. Daniel Joseph Daly.
1645. Joseph Whitworth.
1651. Edward Brasier.
1663. Etienne Cominal.
1664. Thomas Moreton Jones.
1667. Thomas Heaton.
1672. Frederick Levick, Jun., and John James.
1718. John Dunnell Garrett.
1984. John Henry Johnson.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICE TO CORRESPONDENTS.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1793.] SATURDAY, DECEMBER 19, 1857. [Price 3d.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

CHADWICK AND FROST'S PATENT IMPROVED WATER METERS.

Fig. 5.

Fig. 4.

CHADWICK AND FROST'S PATENT IMPROVED WATER METERS.

MESSRS. DAVID CHADWICK, of Salford, and H. Frost, of Manchester, have recently obtained a further patent for improvements in apparatus for measuring water and other liquids, and gas, applicable also to the obtainment of motive power. The following is a full description of their invention, which was briefly described at p. 61 of our number for July 18, No. 1771.

One part of the invention consists in the employment of India rubber as springs for keeping "cupped leather packing" of pistons in contact with cylinders of meters. Another part refers especially to such oscillating cylinders or chambers of meters as are constructed with flexible materials, and consists in the application of surfaces, along which the expanding chambers travel, acting thus as supports, but ceasing to do so at a certain point, at which the oscillation or rocking is then allowed. Another part consists in the combination of three or four flexible cylinders or rigid cylinders or chambers, with telescopic sliding movements so combined, by means of suitable valves, that one or two of such cylinders or chambers are being filled and the others emptied simultaneously. Another part relates to water meters generally, and consists in a method of causing the valves thereof to be changed in position. For this purpose they avail themselves of the force of the fluid, and cause it to act upon pistons, diaphragms, or other apparatus not concerned in the measurement, so as to shift the valves by which the fluid enters and is discharged from the cylinders or chambers.

The first part of the invention is shown at Fig. 1 of the accompanying engravings, which represents the section of a piston with cupped leather packing. The metal plates of the piston are at *a*, bolted together, and the discs of leather at *b*, between which and the plates are rings of India rubber, which act therefore as springs for keeping the leather in contact with the cylinder.

The second part of the invention is shown at Fig. 2, in which, *a*, represents a divided cylinder, constructed of leather or other flexible material. To the plates, *b*, of this cylinder are affixed rods, *c*, which pass through guides, *d*, attached to the divisional plate, *e*. To the cylinder ends, and at each side thereof, are mounted two rollers, *f*, *f'*, which, as the cylinder turns upon the centre, *g*, alternately travel under inclined planes, *h*, *h'*. According to the position shown the cylinder is retained by the incline, *h*, and is prevented from oscillation, but upon the roller, *f*, having arrived at the end, *i*, of the incline it will no longer be retained, and will therefore be free to rise when the other end of the cylinder is falling, thereby allowing it to change the induction and eduction passages through the agency of the valve, *k*, or other suitable apparatus. The other chamber being then filled, the roller, *f'*, will pass under the incline, *h'*, and will be retained thereby, so as to prevent a shifting of the valves until the roller shall have arrived at the end thereof.

The third part of the invention is shown in plan view at fig. 3, in which, *a*, *b*, *c*, *d*, represent four flexible cylinders, secured at their inward ends to a metal block, *e*. To this block are attached guide pieces, *f*, through which two pairs of rods, *g*, *h*, pass, one pair, *g*, being attached to the cylinder, *b*, *d*, and the other pair, *h*, to the cylinders, *a*, *c*. As the cylinders, therefore, expand and contract these rods slide across each other in the guides, *f*. Suppose the fluid to be entering the cylinder, *c*, or *d*, it will be leaving that shown at *a* or *b*, and *vice versâ*. The valves or cocks for effecting this may be of any usual arrangement. In the engraving a revolving valve, *i*, is shown caused to rotate by means of clicks, *k*, which, as the rods, *g*, *h*, travel, arrive in contact with pins, *l*, projecting from the circumference of the valve. The above description alludes to the use of four cylinders, but three may in like manner be combined, and instead of being constructed of flexible materials, they may be made to expand after the manner of telescopes. The cylinders of this and of the previously described meter may be mounted in a casing of any desired form.

The last part of the invention is shown in section at Fig. 4; Fig. 5 is a plan view thereof; Fig. 6, a similar view, showing the passages for the fluid. The cylinder is shown at *a*, provided with a piston, A, of any ordinary construction, but there is no piston rod attached thereto. Above the cylinder is a casing, *b*, to which the fluid is admitted by a pipe, *c*, communicating with a passage, *d*, formed in the cylinder end. To the upper part of the cylinder is fixed a block, formed with three ways, *e*, *f*, *g*, the first of these communicating by a passage, *p*, with the side, B, of the piston, the second with a passage, *h*, leading to the outlet pipe, *h'*, and the third by a passage, *i*, with the side, C, of the piston. Upon the face of the block containing these ways is placed a valve, *j*, elongated at either side, so as to carry pistons, *k*, *k'*, situate within cylinders, *l*, *l'*, affixed to the cylinder, *a*. The elongations or arms of the valve, *j*, are formed with passages, *m*, *m'*, communicating at one end with the cylinders, *l*, *l*, and at the other end opening upward, so as to be capable of being opened or closed by another valve, *n*, and there is also a passage, *o*, in the valve, *j*, communicating with the passage, *f*. The valve, *n*, is mounted so as to slide freely upon a

rod, *q*, carried by the pistons, *k*, *k'*, and is provided with two lugs, *r*, between which is situate a piece, *s*, projecting from a bar, *t*. This bar is united to rods, *u*, *u'*, which pass through leather packing, *v*, *v'*, and carry studs, *w*, *w'*, situate within the cylinder. According to the position shown in the engraving, the fluid which has passed into the casing by the pipe and passage, *c*, *d*, is entering the side, B, of the cylinder by the passages, *e*, *p*, and is there exerting its force so as to drive the piston in the direction of the

Fig. 2. Fig. 6.

arrow, the fluid from the other side, C, passing out through the passages, *i*, *g*, *f*, *h*, and pipe *h'*. The onward motion of the piston, A, will bring it in contact with the projecting part, *w*, of the rod, *u*, by which means the bar, *t*, will be caused to slide forward and carry with it the valve, *n*, so as to allow the fluid to pass from the casing through the channel, *m*, into the cylinder, *l*, and its force being then exerted against the piston, *k*, the valve, *j*, will be caused to slide, so as to change the induction and eduction passages, *e*, *f*, *g*, after the usual manner of such valves, and upon the return motion of the piston the like effect will be produced by the arrival thereof in contact with the stud, *w'*. Upon the valve, *n*, eing moved as above described in order to admit fluid to the cylinder, *l*, the passages, *m'*,

Fig. 1.

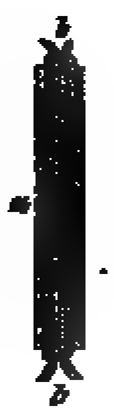
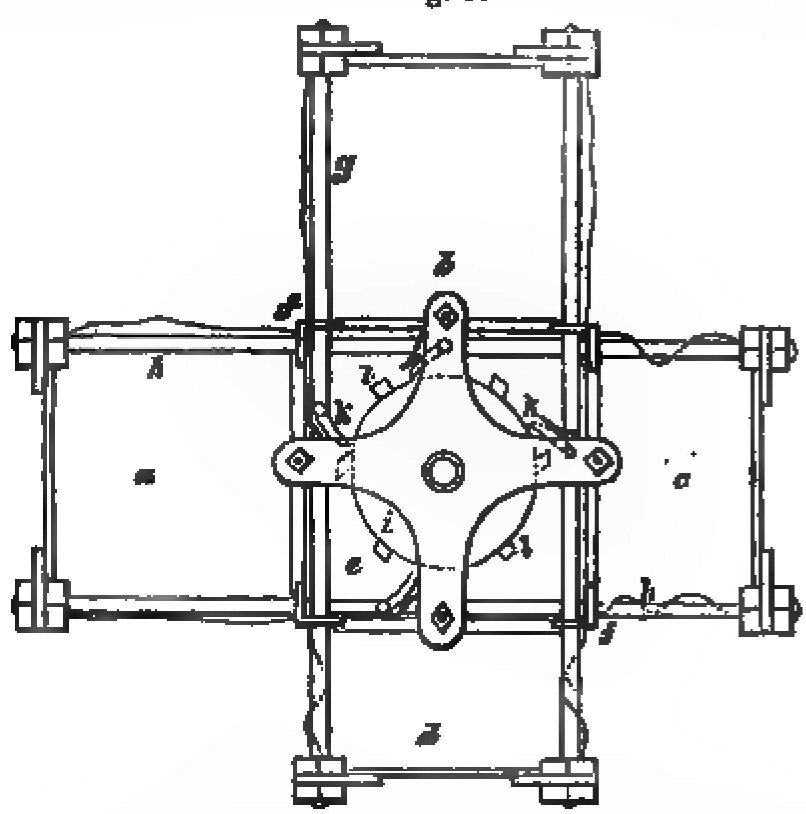


Fig. 3.



and *o*, will be brought into communication, so as to allow the fluid in the cylinder, *l'*, and which has acted therein, to pass out through the eduction passage, *f*, and the same effect will subsequently take place in reference to the cylinder, *l*, the fluid therein passing out through the passage, *m*.

The patentees desire it to be understood that they do not confine themselves to the arrangements described, as many modifications may be adopted upon the same principle. The fluid ways may, for instance, be variously arranged, and the valve, *n*, may be constructed as a cock, or as a valve of any other suitable form, for allowing the same direct action of the fluid upon the valve, *j*.

The "count" may be taken by any usual means from a moving part; the bar, *t*, in Fig. 4, for instance.

There are many of these meters at work with accuracy and full success. Among others, Mr. Hawkesley and Mr. Muir, of the New River Company, have expressed their perfect confidence in its merits. Mr. B. Fothergill, C.E., in a recent paper says:

"It had been felt to be very desirable that persons using large quantities of water should be charged according to the quantity they used, and hence meters were necessary. The price of water in Manchester averaged 1*s.* per thousand gallons, which would be about 6*s.* 3*d.* per thousand cubic feet, while the charge for gas averaged 4*s.* 6*d.* for the same quantity; there was therefore no reason why meters should not be used for the measurement of water, if good and efficient apparatus could be devised." Mr. Fothergill described a number of meters which he said were objectionable on account of the bulk and weight of the machines. "Kennedy's was the best as yet brought into actual use; but it was defective in consequence of its great weight and size; it was liable to stoppage, and so to allow the water to pass unregistered; and it required frequent lubrication. Chadwick and Frost seemed to have remedied these defects. *Their meter was but half the bulk and weight of Kennedy's; it had fewer parts and less wearing surface; it required no lubrication, but worked smoothly without any offensive noise, and was not liable to allow any leakage. It had been found to register with a nearer approach to absolute correctness than any other meter.* One of these meters was exhibited in the room adjoining the Lecture Theatre, and it was announced that a large one might be seen in operation at the Water Works in Salford, on application to Mr. Chadwick."

The following is a copy of a report by Mr. Denny's superintendent of the Salford Water Works, on Chadwick's and Frost's Water Meters, No. 1 Size.

Nov. 29 *and* 30, 1857.

Time.	Gallons passed by Meter.	Gallons indicated by Tank.	Difference.	Pressure in Feet.	Remarks.
15	45	45	0	105	Tap full open.
20	8½	8½	0	110	
15	44	44	0	105	Tap full open.
30	4	4	0	105	
15	51	50	1	140	A small portion of air passed through pipe.
15	50	50	0	140	Tap full open.

ON THE PROTECTION OF WOOD FROM FIRE.

(*Continued from p.* 532)

In addition to such processes as those above referred to, in which the protecting material is forced into the wood by the application of considerable pressure, trials have been made with agents of different kinds, in solutions or baths, in which the wood was steeped or allowed to soak for some hours, so that it might be in a slight degree impregnated with the material, or that a superficial coating of the protective might at least be formed.

Some of these methods have been made the subject of experiments by order of Lord Panmure, with a view to test their merits.

One, proposed by W. C. Salomons, of Paris, consisted in immersing the dried wood alternately in two baths, the one containing three parts of acid sulphate of alumina, and one part of glue, dissolved in six parts of water; the other consisting of two parts of dry chloride of calcium, one part of glue, and seven parts of water.

The objects which the inventor wishes to attain by the use of these solutions are, firstly, to impregnate the wood slightly with one of the salts (the chloride of calcium, for example), and then, by immersion of the wood in the second bath, to effect the decomposition of the first salt by the second in the pores of the wood.

Thus the chloride of calcium and sulphate of alumina should become converted into sulphate of lime and chloride of aluminum; the former an almost insoluble substance, the latter a soluble deliquescent body, possessing the property of converting the glue employed, together with the salts, into an insoluble body—a species of leather.

The pores of the wooden surfaces are, therefore, by the treatment in question, to be filled up by particles of a substance nearly

insoluble, and unalterable by heat, which, together with the soluble salt, also present, are to be protected and united by means of the precipitated glue, which dries up to a hard horny substance.

The experiments made by this process showed that the glue employed in the solutions greatly impeded the penetration of the wood by the saline matter, and also caused the decomposition of the salts to be very partial.

The protective property of the coating formed on the wood, prepared by this process, was not found to be considerable, while the expense of the materials was great, as compared with others equally efficient.

The successful results obtained on the Continent by the application of alkaline silicates as protective materials, led to an examination into the comparative value of the cheapest of these, the soluble silicate of soda, as an agent for decreasing the combustibility of wood.

The property possessed by the soluble alkaline silicates, of being readily softened by hot water, and thus converted into a state of solution, while they are but slightly affected by cold water, renders their application to wood, either in the form of a bath, or as a wash, very simple. Their dilute solutions being readily absorbed by wood, the surfaces of the latter, as it dries, assume the form of a hard coating.

The experiments made in the first instance with the silicate of soda, and the results obtained, are described in the following extract from the official report:

"Various specimens of dry wood were prepared with silicate of soda, by being soaked for a few hours with a weak solution.

"Upon examining the interior of these, after the removal from the bath and subsequent desiccation, the silicate was found to have penetrated about a quarter of an inch on all sides.

"On piling the above over a fire, together with specimens of unprepared wood, and others that had been prepared by different processes, the superiority of the silicate of soda, as a protective agent, was fully established.

"Some specimens of wood were then simply painted with a moderately strong solution of silicate, and afterwards placed, together with unprepared wood, in a pool of coal-tar naphtha, some of the latter being thrown over the surfaces of the wood.

"Immediately on the ignition of the naphtha, the wood was surrounded by flames, which soon fired the unprepared pieces, whilst those coated with the silicate only ignited after a time at the edge, and were scorched or baked by the heat, but not burned.

"A wooden hut, similar in construction to those at Aldershot, having been erected in Woolwich Marshes, for the purpose of testing the value of Phillips's Fire Annihilator, advantage was taken of the opportunity thus offered for trying, to some extent, upon a larger scale, the merits of the silicate as a protective.

"Shortly before the experiment took place, an application was made to me by the officers of Royal Engineers, for the preparation, in some way, of a portion of the building with a protective agent.

"One part was painted, inside and out, with a mixture of lime and alum, which, however, was not found upon experiment to act as an efficient protective against fire.

"Another part of the hut was painted, inside and out three times, with a solution of silicate of soda.

"Unfortunately for the fairness of the experiment the building was constructed with a double boarding, so that it was only possible to coat or impregnate the planks on one side. Nevertheless, the value of this agent was established beyond doubt.

"A large heap of shavings was lighted in the interior of the hut, against the coated portion of the wall. The flames played fiercely upon the latter for some minutes, but only succeeded in kindling one edge of a plank, and that portion did not blaze, but smouldered for a short time.

"By the heat of the fire the salt was drawn to the surface of the wood, and fused, forming a glazing upon it.

"Subsequently, when the whole building was destroyed by fire, after unsuccessful attempts to extinguish it by means of the 'Annihilators,' the fierceness of the flames was such that few materials could have withstood it; yet of the exterior coated portion of timber several planks remained.

"Upon examining these, the unprotected surfaces which had been directly exposed to the fire were found to be completely charred; but this charring had extended only to the point to which the silicate had penetrated from the other side of the plank.

"This experiment is considered to have proved that the silicate of soda is a very valuable protective agent, and that even when simply applied as a paint, it will serve to protect wood for a considerable time from fire, and to retard greatly the spreading of a conflagration."

Shortly after the experiments above described were made, the possibility suggested itself of rendering the coating of silicate less destructible by exposure to wet, of increasing its efficiency as a protective, and of rendering its application more economical by combining with its use that of ordinary lime wash.

Some pieces of plank were prepared in the following manner: a dilute solution of the silicate of soda was first applied with a brush; when this had thoroughly soaked into the wood and dried, a thick lime wash (made by slaking some lime, and reducing the hydrate to a smooth wash of the consistence of thick cream) was applied; and, lastly, after the planks had been exposed to the air for two or three hours, they were painted with a second solution of silicate of soda, somewhat stronger than that first used.

The effects of the liquids thus applied, both upon the wood and on each other, will be more particularly pointed out in a report subjoined.

Several experiments, precisely similar to those described below, were made with the prepared planks, the results proving most satisfactorily that the protective coating resisted to a remarkable degree the action of heat, evinced no symptom of peeling off the highly heated surface of the wood, and protected the fibre to a great degree from the influence of flame playing upon its surface.

The durability of the coating was tested by exposing prepared surfaces of wood to a continuous stream of water and to heavy rains for a considerable period. It was found that the rain had no effect upon the coating: in the other more severe test the material was only to some extent removed, after a time, on that spot where the jet of water first impinged upon the wood.

(*To be concluded in our next.*)

THE LAUNCH OF THE "LEVIATHAN."

Tuesday, Dec. 15.

Mr. Brunel has not been altogether unfamiliar with failures; but no failure of his ever did so much to lower the reputation of English engineers as the launch of the *Leviathan.* Having first, by the construction of that enormous vessel, concentrated the attention of the world upon him, he has now presented to it the greatest and most costly example of professional folly that was ever seen. Was ever such a spectacle witnessed as thousands upon thousands have for weeks past beheld on the Thames!—an English engineer, at the head of multitudes of mechanics and labourers, breaking ponderous engines, rending enormous cables, crushing solid masses of timber, bursting strong iron vessels, forcing up the soil, tearing up the very bed of the river, expending vast sums of money, impoverishing shareholders, ruining the vessel herself, spreading terror around, imperilling life—keeping this up day after day, week after week, and even month after month, and all in order merely to *lower* a ship from the shore to the river! It is our imperative duty to endeavour to transfer the disgrace of such a scene from English engineering science to the individual engineer who is alone responsible for it. If the scene had been connected with an undertaking of the Government, a thousand journals would have teemed with reproach and invective. If the Admiralty happen even to purchase a ship which after a time turns out bad, men cannot refrain from seeking to trace the fault to some unhappy public servant, and to visit him with becoming retribution. Why, then, should the press pass unnoticed the blunders of a private individual who has far out-stripped the mismanagement with which any Government ever executed a work of plain, practical engineering?

The first question to be asked is, why was the *Leviathan* built where she is? (for we cannot here discuss the advantages and disadvantages of such a vessel in the abstract.) Recent experience, both in our own dockyards and in America, has shown that the launching of ships much less in weight than the *Leviathan* is sometimes attended with difficulties which are not easily overcome; such, for example, as the stoppage of the ship upon the ways, as in the cases of the *Cæsar* at Pembroke Dock, the *Marlborough* at Portsmouth, and the *Queen of the Pacific* at New York.

In all these cases, moreover, the ship was launched lengthwise, in the usual manner, so that the weight was more easily distributed over a large surface than when side-launching has to be resorted to. With these facts before him, it was, in our judgment, an altogether unnecessary display of self-confidence in Mr. Brunel to build the ship where she is, particularly as the narrowness of the river and the populousness of its banks rendered a rapid launch extremely dangerous. Beside the influence which the inherent difficulties of the case must have exerted upon Mr. Brunel the further influence of professional dissuasion was, we are informed, brought to bear upon his judgment. At the Institution of Civil Engineers, before the ship was commenced, strong adverse opinions were, we are told, expressed to him by several influential members of that cultivated and experienced body, but without effect; and it is even rumoured that a chalk-pit near the Thames was offered the Company, as a dock to build the ship in, for a total rental of £10,000, the owner undertaking to fit it with suitable gates, &c., for the purpose. But whether this be true or not, Mr. Brunel's best friend (if he have friends, of which our intercourse with engineers renders us doubtful) cannot question that the construction of such a ship upon such a

spot as that selected was most rash and improvident. A suitable dock would have cost far less than the launch has cost. The exhibition of himself, mounted upon a rostrum, with signal-flags in his hands, amid thousands of spectators at a grand launch, can hardly be considered to have weighed greatly with Mr. Brunel in selecting the site, even were he supposed capable of having foreseen the august presence of the Siamese Ambassadors!

Some persons will probably think these statements of ours might have been made earlier with advantage. This we do not believe. We certainly should have made them when the first failure occurred with the launch, but we thought it would be more graceful to defer them until the vessel was afloat. That event has, however, been so long postponed that it seems imprudent to wait longer for it. Had we made such statements at the outset of the vessel's construction, they would not have turned Mr. Brunel from his purpose, and could have had no other effect than that of flinging the heavy pecuniary burden which has now to be borne upon the shoulders of fewer shareholders.

The next question for consideration is, why has Mr. Brunel, having built his ship where she is, been so utterly unsuccessful in the launching of her? In the first place he has, in our opinion, made a fatal innovation by introducing iron rails upon his slide-ways, and iron plates upon his bilge-ways. What earthly advantage over a large surface of smooth greased wood did he expect to get out of a small surface of rough rusty iron? This question Mr. Brunel will not, in all probability, answer. It is his part, and, according to the *Builder* of Saturday last, it is the part of Mr. Yates, the Company's Secretary, also, to treat the press with contempt, and to cast the cash of the Company into the river Thames with the utmost liberality. But until Mr. Brunel or some one else does answer the question, there is no more to be said upon the choice of the iron rails. Mr. Brunel preferred them, you may depend on't; Mr. Brunel preferred them, and there's an end on't. Even the shareholders will not, we fear, get beyond this point.

Iron surfaces having been chosen, the proper inclination to be given to the slide-ways was the next point to be considered; and here there was an opportunity for a little judicious assumption and calculation. Because, although the iron on iron would produce an immense amount of friction,* this might be provided for by giving a suitable inclination to the slide-ways. Here, however, nothing has been done with any tolerable approximation to the truth. So small is the inclination, as compared with the inclination required, that all the combined powers yet brought to bear upon the ship have failed to get her to the water; and it seems as if all the King's horses and all the King's men will be required before the task is accomplished. Where then is Mr. Brunel's engineering ability, if he fail thus utterly upon such a point? But he has not mistaken the inclination only. He is equally at fault in his distribution of the weight upon the two cradles. The after cradle has to sustain much more than one-half the weight of the ship. The consequence is, as we said in a former article, the friction upon the slide ways is most unequal, and the ship twists upon the ways, and thus adds still more to the difficulty of moving her. It will, perhaps, be scarcely believed, although it is perfectly true, that some days since Mr. Brunel actually had *two or three hundred tons* of water placed in the fore part of the ship in order to get rid of this evil; and this in a case where the *weight* is the one great thing to be dealt with!

We do not feel disposed to criticise the measures taken since the commencement of November last to push the ship off; because they have consisted simply in the continual addition of the most obvious appliances available for the purpose.

From all these things our readers must draw their own conclusions. We desire only that they shall not consider the launch of the *Leviathan* a task beyond the powers of English engineers. It is the name and repute of Mr. Brunel only which are staked upon the undertaking; and we are perfectly confident that there are many men among us who would have launched the ship with ease, success, and security.

Thursday, 5 P.M.

Our weekly summary of proceedings connected with this launch not having reached us, we must content ourselves with repeat-

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* Our friend and correspondent, Mr. W. B. Adams, in a late letter to the *Spectator*, says:—"One account attributes to Mr. Scott Russell the authority of the saying that the launch failed because the friction of oiled iron on oiled iron is an unknown quantity, the friction of wood on wood with tallow interposed being a known one. Now, inasmuch as we know that an iron axle involves less friction than a wooden one, it follows that if disproportionate friction be the cause, it must arise from the great disproportion of bearing surface in the applied iron as compared with the wood causing the squeezing out of the lubricating matter, and the actual impact of the iron surfaces, or from some other cause, or both combined. What is the philosophy of the matter?" It should be remembered, however, that the iron rails and plates of the launch are constantly rusting in the air and water, and cannot be got at beneath the ship. They must not, therefore, be compared with a smooth lubricated axle. The friction in the one case must be enormously greater than in the other. Still, the reduction of the bearing surface by using rails situated at considerable distances apart is, of course, a great evil.—EDS. M. M.

ing here what the *Times* states of yesterday's proceedings, viz., "That nearly every portion of the powerful gear was broken, without producing the slightest effect in the way of movement upon the monstrous vessel." She did, however, at one time slip about 3 feet. It is not a very flattering thing to be supported by the *Times* upon a question of science, but the following passage from its article of this day singularly confirms our preceding remarks: it says, "The real reason (of the failure) we fear, will be found in the fact that the iron bars of the cradles, and the railway metals of the ways, are both considerably rusted, and that this resistance, added to the immense friction always caused by running iron on iron, offers such a bar to the further progress of the vessel as will require half the hydraulic presses in the kingdom to overcome."

We must not omit to contradict the foolish report which has got abroad to the effect that the slideways were laid with a changing inclination—part 1 in 10, and part 1 in 12. This is quite erroneous.

NORDENSKIOLD'S MANOMETER.

DESCRIPTION OF AN IMPROVED MANOMETER, OR PRESSURE GAUGE, TO MEASURE THE PRESSURE OF AIR IN BLOWING MACHINES.

BY M. DE NORDENSKIOLD.¶

The manometer hitherto in use does not admit of very exact calculations being made of the force and quantity of air which issues from a blowing machine, each little inequality in the pressure rendering the result so different that it is impossible to obtain a true register. Generally, the mercury column of the manometer fluctuates considerably; and if the average of the highest and lowest pressures is taken, which can be done with sufficient exactitude, the true average pressure is not obtained. The annexed engravings show an alteration in this instrument which altogether remedies the inconvenience in question. The change is founded on the same principle as that employed in the marine barometer to prevent the fluctuations of the column of mercury occasioned by the motion of the ship. Fig. 1 shows a front view of the instrument. Fig. 2 is a section through the line, A B. Fig. 3 is a section through the line, C D; and fig. 4 is a back view of the same, showing how the pipe, E D, is fixed. The same letters denote the same parts in all the figures. *a b*, *c d*, are two glass tubes open at both ends and cemented parallel to one another in the two boxes *n n*, *m m*, in such manner that the upper end of the tube, *a b*, communicates by the hole, *f f*, with the air, and the tube, *d c*, by the hole, *g g*, with the channel, *h h*, of the tube, E D. This tube is attached by a screw to the box so as to be capable of being turned, in order that if the hole applied to the blowing machine, and which receives the pipe, be not quite horizontal, the instrument can be maintained

Fig. 1.

Fig. 2.

in a vertical position. Towards *a* and *d*, the tubes are also open and cemented in the bottom, *m m*, which is also provided with holes for the two ends of the pipe, *s s*. At this part, a keeper, *p p*, held by the two screws, *q q*, is fixed. In this keeper a portion of a bent thermometric tube, *s s*, is cemented in such manner that the two ends enter slightly into the two open ends of the pipes, *a b*, and *d c*. This piece, which is always fixed when the instrument is in use, can be separated from it when it is required to clean the tubes. When it is desired to use the instrument, the mercury is put in by the channel, *f*, until it rises to the height of three or four inches in each tube—the instrument being in a vertical position. When the manometer is thus provided with mercury, the tenon of E D is introduced into a suitable hole in the blowing machine and placed in a vertical position. The mercury then descends in the tube, *c d*, very slowly, and ascends in the other, *a b*, until the difference between the column of mercury corresponds to the pressure of the air in the blowing machine. By this arrangement rapid and intermittent variations would

not have any influence on the height of the mercury. To measure the difference of the columns of mercury the tubes are provided with two envelopes, *w* and *w*, which can be pushed up and down until the lower parts of the envelopes are at a level with the surface of the mercury. The difference of the height of the two columns of mercury, marked on the scale, *x x*, corresponds exactly to the average pressure of the air.

THE STEAM FERRY OVER THE NILE.

At the meeting of the Institution of Civil Engineers, December 8, 1857, R. Stephenson, Esq., M.P., President, in the Chair, the Paper read was "Account of the Steam Ferry over the River Nile, at Kaffre Azzayat, Egypt," by Mr. T. Sopwith, M. Inst. C.E.

This ferry was on the railway from Alexandria to Cairo, about midway between those places. It was intended to convey, temporarily, until a more permanent and fixed structure, now in course of erection, could be completed, the trains between Kaffre Lais and Kaffre Azzayat, towns on opposite banks of the Nile. The river, at the point in question, was in a horse-shoe form, of about 3 miles in length, and included a tongue of land, little more than a mile in width, along the middle of which the railway passed. The distance between the fixed platforms or jetties at the opposite sides of the river was 1,100 feet.

Ferry boats guided by chains were in use in several parts of England, having been first adopted on a large scale by the late Mr. Rendel. The peculiarity of that over the Nile consisted in its having a moveable platform to receive the railway trains.

The several mechanical arrangements of the ferry were directed to facilitate the placing on the platforms the engine and carriages composing a train, with the passengers conveyed by it; to provide sufficient power for taking the ferry and its ponderous load across the river, in a direct line from one jetty-head to the other, and so to arrange the level of the ferry platform as to enable it to coincide at all times with the line of rails at either side of the river—the variations of level of the waters of the Nile amounting to 27 feet between the high and low Nile.

The framework rested on a flat-bottomed and shallow barge of oblong form, with the corners taken off, no attempt having been made to give it the form of a ship. The length of this barge was 80 feet, width 60 feet, and height 60 feet; the draught of water, when loaded, was 3 feet 6 inches, and when unloaded, 3 feet. It was worked by two steam engines, each of 15 H. P., placed horizontally on each side, which suffices to take the ferry and its load across the river in about six minutes. The two chains were 28 feet apart, and passed just outside the standards. The wheels were 9 feet in diameter, and twelve strokes of the engines gave one revolution of the wheels. The barge was entirely of wrought iron, and consisted of eight transverse main ribs, turned up at each end against the sides of the vessel, and two longitudinal ribs extending from end to end of the vessel. Upon these ribs was erected the framework which contained the moveable platform, consisting of iron standards, corresponding in number and in position with the ribs, supported, with the exception of those at the extremities, on the outer side by diagonal braces, forming flying buttresses, resting on the turned-up ends of the cross ribs of the barge. These standards were strengthened by horizontal beams and by diagonal bracing. The whole framework was surmounted by a rigid platform or deck of timber, at an elevation of about 60 feet above the water; and intermediate between this deck and the boat was the moveable platform. This platform was composed of eight wrought-iron beams, one opposite each standard of the outer frame, covered by timber, having upon it a double line of rails, laid on longitudinal sleepers, exactly corresponding with the fished extremity of the railways on the jetties.

The arrangements for effecting the vertical movement of the middle platform were very simple:—To the front of each standard there was a cast-iron frame, extending from near the bottom of the boat to about 20 feet below the top of the great frame. This frame had three vertical recesses—the two outer ones having teeth cast in them at intervals of 6 inches, so as to form racks—and being fixed in position alternately. In the middle recess was a strong wrought-iron ladder with wrought-iron rungs at intervals of 3 inches. This ladder moved freely up and down the central recess, and was attached at the top to a screw operated upon by a capstan. A strong bolt sliding in a cast-iron socket at each end of the cross beams of the middle platform was so arranged as to work easily into the rack-like recesses. At the end of each beam there was also a strong rod jointed at the bottom, and terminating at the top in a hook, so as to lay hold of the rungs of the ladder. Whilst one man on the middle platform worked the bolts and adjusted the hooked rod, another on the upper platform turned the capstan, and thus the platform was raised or lowered by intervals or steps of 3 inches at a time. The last length of rails on the jetties was placed on a hinged plat-

form, so that an exact coincidence of level could always be ensured. Simple means were adopted to ensure the simultaneous action of all the capstans, so that the intermediate platform should be moved uniformly.

The ferry had been in operation for the last eighteen months with perfect success. It was designed by the engineer-in-chief of the line, Mr. R. Stephenson, M.P., President, and the several parts of the structure were manufactured at the works of Messrs. Stephenson and Co., at Newcastle-upon-Tyne, and afterwards fitted together on the spot, for Mr. Edward Price, the contractor for the railway.

In the discussion further details were given of the construction and method of working the ferry; the cost was stated to have been £18,000, including the jetties at both ends, carried on Mitchell's screw piles, with protecting cylinders at the extremities;—the method of sinking the cylinders was by Hughes' pneumatic plan of using a "plenum" instead of a vacuum;—the mode of attaching the chains on the two shores, was by having weights rising and falling within a cylinder, at each extremity, to compensate for the drag upon the chains. The plain parallelogram form had been adopted because it was the best for giving great flotation, and affording stability. Speed was not an object when the traversing could be effected in six minutes.

In the construction of the machinery of the ferry, great credit was awarded to the late Mr. C. H. Wild and Mr. Dempsey for the details of the machinery; to Mr. G. R. Stephenson for the method of lifting the platforms; and to Mr. Rouse and Mr. McLaren for putting together and erecting the whole and making it work so thoroughly well.

Before settling the design, the floating bridges invented and constructed by the late Mr. Rendel, at Plymouth and at Portsmouth, were carefully studied, and the parts most suited for the conditions of the Nile ferry were copied; these conditions were, however, so peculiar, that they rendered necessary a design of an entirely novel character.

It was urged that these floating bridges were well adapted to certain positions in India, and a hope was expressed that when tranquillity was restored, these and other similarly useful works would be authorised by the Government.

It was objected that these steam ferries, although they were adapted for this precise position, could not be advantageously employed in India, where the rivers were numerous, and were frequently crossed by the railways; it was, therefore, contended that it would be undesirable that this institution should appear to recommend the system generally. To this it was replied, that good engineers did not adopt or apply systems of this kind indiscriminately, but used special machines for the situations to which they were fitted. The objections to the employment of these steam ferries, as not being adapted to the rivers of India, were easily shown to be ill-founded; it had not been contemplated to use them on the numerous small rivers, or on those which became torrents during the rainy season and were dry during the summer, but the system was well adapted to very wide rivers, where there was always plenty of water, and where the construction of permanent bridges would be disproportionately expensive—in this early stage of Indian Railways.

GUIDEWAY STEAM AGRICULTURE.

Mr. P. A. Halkett has patented, and is now introducing, a system of what he denominates "Guideway Steam Agriculture," which consists in laying down, at wide intervals, permanent guideways or rails, by which means a platform, carrying the motive power, is supported and guided, and to the under-side of which are attached the various implements to be used. "The whole of the weight being carried, without bearing in any way on the land, culture can be forwarded in any weather and state of the ground without injury," says Mr. Halkett, "even on the heaviest clay soil, leaving it in a state of lightness impossible to arrive at where the weight of men, implements, horses, or tractive power is constantly consolidating or poaching it; added to which, by consecutive ploughings in the same furrow, it can be cultivated to a depth hitherto unattainable except by the costly operation of deep spade trenching, while fresh soil to an exact quantity required may be brought up and intermixed with the top soil. The surface of the soil may be pressed by rollers attached to and drawn by the steam platform. The weight also of other things besides that of the engines and implements will be carried with great advantage upon the rails, all the crops will be carried off and the manure carried on to the land; and when the number of tons weight is considered which these constitute upon many farms or gardens, varying from 20 to 100 tons per acre per annum, and the extent of land that there is for their cartage, and it is remembered that a horse draws *twenty* times as much on a railroad as it does on a ploughed field, while in addition steam power performs work much cheaper

than animal power, it will be seen to what advantage, in comparison with others, I can carry great weights. In fact varying soils may be carried from one part of a farm to another for intermixture with each other, or, if a farm abuts a railway, be brought from a distance, and deposited on the spot required, without in its transit once coming off rails. An improvement to the land may be rendered practicable by this means, where now one is impracticable, and landed estates often be increased in *permanent* value; also farms thus situated may send any of their produce to towns without the crops having been off a rail from the time of leaving the soil, and, in return, manure come back in the trucks. The quantity that could be ploughed per day with power suitable to a farm of 1,000 acres would be 25 acres, and two men would be all that are required to conduct the operation. This calculation, it must be understood, is based upon the work which I have repeatedly done. And, moreover, when the time presses, by a change of men, double this amount, namely 50 acres, may be done in the twenty-four hours, because the operation can be carried on by night as well as by day. Conceive the great advantage of being able thus to break the land up in favourable weather, or for a rapid autumn cultivation. This great economy of time I may add is also available for reaping and carrying harvest. The rails forming a guide to the implements, insure that every operation shall follow in the same line, or parallel to it. Thus I have drilled by the steam machinery rows of plants, and when they have come up I have hoed them repeatedly by the same steam machine with the greatest perfection, and at all stages of their growth. In fact, I have placed the blades of the hoes on each side of the rows so near to them as to cut within half an inch distance from the stalks without doing any injury to a single plant, as the machine hoed them. I may mention that I have frequently placed upright in the ground two small sticks (two pencils) at a distance from each other of *one inch*, and having fixed a small stirrer or tine, propelled it at full speed of engine, cutting the ground between the sticks without, on any one occasion, disturbing either of them. The importance of this precision of operation will be appreciated by those who are aware of the large price paid by our best cultivators and market-gardeners for hoeing by hand labour, in consequence of the imperfection of horse-hoeing, while the impossibility of hoeing by horses when the crops are close or high is acknowledged."

Mr. J. Braithwaite, C.E., whose great ability and varied experience as an engineer are well known, has written a report upon Mr. Halkett's invention, in which he says, "I am of opinion that capital may be most advantageously employed in cultivating land upon your patent principle with great economy in labour and immense advantage in an agricultural point of view, enabling the farmer at all seasons of the year to cultivate his ground, without damage to his crops, and I cannot help again repeating and impressing upon those interested the extraordinary facilities and value in the treatment of crops to all market gardeners, more especially in the adoption and use of your invaluable method of stirring, hoeing, and underground watering."

PHENOMENA CONNECTED WITH ROTARY MOTION.

THE GYROSCOPE. — PRECESSION OF THE EQUINOXES.—SATURN'S RINGS.

At the last meeting of the Philosophical Society of Glasgow, on Wednesday, Mr. Edmund Hunt, secretary to the Institution of Engineers in Scotland, read a paper "On Certain Phenomena connected with Rotary Motion; the Gyroscope; Precession of the Equinoxes; and Saturn's Rings."

After referring to the more important authorities on the subject of rotary motions, Mr. Hunt gave an elementary explanation, assisted by several diagrams, of the curious phenomena exhibited by the gyroscope, a philosophical toy which has become very common of late years, and is to be found in every optician's shop. This toy consists simply of a flywheel set on pivots in a ring, and placed on the point of a pillar in such a way that when the wheel is not spinning, gravity makes it fall down against the pillar. When the wheel is set spinning it *does not fall*, but moves horizontally round the pillar in *seeming* disregard of the laws of mechanics. The complete explanation of this and other similar phenomena consists of several steps, and cannot be rendered intelligible without diagrams. Mr. Hunt stated that the motions of the instrument had the effect of transferring the downward pressure due to gravitation from the centre of gravity of the instrument to the point of support on one side. In an experiment shown in confirmation of this view, the instrument was supported at one end of a balanced lever and the latter indicated the same weight or pressure when the wheel was spinning with the centre of gravity to one side of the point of support as when the wheel was motionless, and with the centre of gravity below the point of support. It was stated that a modification of the gyroscope was

invented as long ago as 1810 or 1812 by Bohnenberger. In this modification, the wheel in the form of an elipsoid or flattened ball was suspended in rings in a balanced condition, and a weight added on one side was used to show the action of gravitation, instead of the weight of the instrument itself, as in the modern gyroscope. Mr. Hunt said that if a perfect sphere were employed, the weight would not be carried round horizontally, but would move in a series of curves. He said that a common gyroscope might be made to show these curves, if suitably arranged. He stated that, being by accident led to consider what would be the effect of removing the fly-wheel further from the point of support than is usually done, he concluded from theory that the instrument ought to move in the curves referred to: and he accordingly placed the wheel on a lever at a distance of 12 inches from the point of support, balancing the opposite end of the lever, so that the wheel slightly preponderated. On the wheel being set spinning, it moved through a series of curves, descending several inches, and then rising again several times during its movement round the centre of support. This was a very beautiful experiment, and appeared to create considerable surprise. The curves through which the instrument moves are of a cycloidal character. If the instrument is left to itself, it moves through a series of pointed curves; if a forward horizontal impulse is given, the points disappear, and the curves become gentle undulations and a horizontal line, if the impulse is strong enough; and finally, if a backward impulse is given, the curve becomes looped, each succeeding portion returning back and overlying the preceding portion.

The discussion of the subject was postponed.

The lecture was illustrated by some ingeniously constructed apparatus.

GUINIER'S STEAM WINDLASS.

M. Guinier, a foreign engineer, has recently patented, in this country, a steam windlass which consists of a pair of steam cylinders placed on opposite sides of suitable framework, within which the drum or windlass proper is mounted in bearings. Two smaller drums extend beyond the framework, one on each side. On one of the ends of the main drum a toothed wheel is keyed, and this is geared into by a pinion upon the crank shaft, to which rotary motion is communicated from the piston rods through connecting rods. There is a contrivance for throwing the toothed wheel out of gear with the toothed pinion on the crank shaft, and for bringing into gear with it a pinion on another shaft fitted with crank handles to be worked by hand. A brake in the form of a metal band is passed round a smooth flanged wheel keyed to the main drum. The two ends of this band are united to a pedal, to enable the brake to be put into action by the foot. A lever handle is made to work a slide in a steam box; and by means of this slide, and suitable pipes, ports, and passages leading to the two cylinders, the steam is wholly or partially shut off, let on, or reversed at will. Two steam cylinders are found most convenient, but the number may be varied. The boiler to be employed with this windlass consists of an outer vertical case, with vertical tubes for the passage of the flame and products of combustion from the furnace to the chimney; and its chief peculiarity consists in bolting the case in such manner at top and bottom that it can be readily removed in order to cleanse the outside of the tubes, and remove from them any incrustations which may have adhered thereto. The boiler is fed by a pump worked by the steam cylinders. For extensive building operations, the windlass and boiler are fixed upon a bed provided with wheels. When used on railways the boiler should be horizontal.

The Carpenter and Joiner's Assistant; a Complete Course of Practical Instruction in Geometry, Geometrical Lines, Drawing, Projection, and Perspective—the Selection, Preparation, and Strength of Materials, and the Mechanical Principles of Framing, with their Applications in Carpentry and Joinery. Illustrated by Numerous Engravings on Wood and Steel, comprising Examples of some of the best Timber Constructions executed in Great Britain, on the Continent of Europe, and in America. Parts I.—IV. Blackie and Son, Glasgow, Edinburgh, London, and New York.

These are the first instalments of what promises to be a very valuable work. Evidently no expense is being spared in its preparation, for it abounds in costly plates and woodcuts of the most perfect kind. The letter press already published comprises a full and accurate treatise upon really *Practical* Geometry; a second, equally excellent, upon the construction and use of Drawing Instruments; and part of a third of great value upon Stereography—or, in other words, Descriptive Geometry. We need scarcely say that the subject and plan of the book are such that it will meet a want which is widely experienced, and will most opportunely provide intelligent mechanics and apprentices with the very means they are beginning to seek, in every city and

town, in order that they may acquaint themselves with the knowledge whereon the arts which they daily practise are based. We strongly urge our practical mechanics to obtain and study it.

A Practical Treatise on Cast and Wrought Iron Bridges and Girders, as applied to Railway Structures, and to Buildings generally, with numerous Examples, drawn to a Large Scale, selected from the Public Works of the most Eminent Engineers. Parts XXIII.—IV. By W. HUMBER, Assoc. Inst. C. E., Mem. Inst. Mech. Eng. London: E. and F. N. Spon, Bucklersbury. 1857.

THESE parts conclude Mr. Humber's Treatise, which deserves to be mentioned with great favour. We know of no work so rich in practical illustrations of existing structures, and we heartily join the author in thanking those engineers who have so liberally contributed their detailed plans for publication here. They have conferred a lasting obligation upon their professional brethren. We find no further notice of Mr. Humber's new series, spoken of in our Magazine for Oct. 17.

LIGHTS FOR HOUSES AND STREETS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—If the Allied Gas Company do, in consequence of their amalgamation, raise their prices, it is to be hoped that they will employ the extra profits in improved methods of purification, for it has been asserted on good authority that, while sulphur exists in such proportions as is usual, it cannot be employed in dwellings, however well ventilated, without great detriment to health.

This, then, for the present leaves the household table to the care of the lampmakers; and of these there is a goodly host, each, with becoming earnestness, recommending his peculiar invention.

Palmer's candle lamps continue to sell, and always will; for many admire the philosophy of candlelight, when properly supported as the candle is consumed, and "requiring no snuffing."

Young, as if to prove himself not ungrateful for the almost universal patronage his Vesta lamp received some years back, has presented to the public a new edition, "revised and corrected," called the Bin-Oxydized Light, by which he is said to prevent smell or showers of black snow.

A namesake of his, Young, of Manchester, taking into his service the Prussian workmen, has applied his paraffine oil to a lamp they have arranged, and it is supposed that this winter it will be on many a table.

Pyrogenic oil, as manufactured by the Messrs. Holmes, is in their lamp converted into gas, and burnt without smell. It seems to be a lamp for the middle classes, is perhaps the whitest light known, and is said to be cheap and constant. It is at the Polytechnic.

Little's Poor Man's Candle is in reality a lamp constructed to burn paraffine oil. It is exhibited at the Society of Arts' Museum, is announced to cost next to nothing in burning, and to yield a fair light.

The Moderator, found in expense of burning and repairs to be an "aggravation," has been discontinued by many; but the more opulent part of the community seem to admire its volume of light, to the exclusion of considerations of cost.

Indian affairs being now prominent, have most likely brought the existence of Rangoon oil to our knowledge; and while the veteran candle-maker, George Fergusson Wilson, is utilizing the solid parts of it, the oleaginous portions are about to be employed in illumination, in a modification of the moderator and solar lamps, under the auspices of "Dean's, Opening to the Monument."

There are in London some curious instances of antique illumination:—Jones, of Holborn, the optician, lights his shop with common candles; Stevens, in Tottenham-court-road, and the glove-maker of Cheapside, with sperm-oil lamps; while the front of a house in Ely-place is lighted by the grease and wick lamp of old London.

I am, Gentlemen, yours, &c.,

BRASSEY.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—I want a ready method of lighting a large house in the country by gas. I am told that the late Mr. Mansfield had an apparatus to enable benzole to be used as an illuminating agent. Could any of your readers inform me where such an apparatus is to be procured, and also if there are any objections to the use of benzole in a vaporized state, or more difficulty in the management of the apparatus than in that of ordinary gas? By so doing he would confer a favour on

Yours sincerely,

VULCAN.

Dec. 14, 1857.

MEASURING THE DEPTH OF THE SEA.

To the Editors of the Mechanics' Magazine.

Gentlemen,—My attention was arrested by J. A. D.'s letter in your last impression, on a method of taking soundings. I fear his method would not be practicable. I fancy it would be a difficult matter, or perhaps an impossibility, to make hollow balls of the description he mentions strong enough to resist the enormous pressure at great depths and yet break on coming in contact with the bottom. Besides, admitting the possibility of this difficulty being overcome, there is a strong possibility of even slight currents carrying the bubble of air to such a distance that its arrival at the surface would not be seen at all; or, even supposing that it came up within a reasonable distance from the ship, all hands must be on the look-out.

I have an idea that the pressure at different depths could be taken advantage of to determine the depths; or, to take my first crude idea, imagine that one of the steam boiler pressure gauges now so common, say one of Bourdon's, had an extra indicator or finger so attached that it would move forward with the original finger but could not return: imagine also that a suitable loop was attached to the instrument, to which a rope could be tied, and that the fingers both stand at zero. The instrument is lowered into the water gradually; as it sinks, the fingers move: when it has sunk 33 feet they will point 15lbs., to 66 feet, 30lbs., and so on. Now raise the instrument. Supposing it has reached the bottom, the real finger will gradually go back to zero, but the additional one will remain pointing to the pressure corresponding to the depth to which it has been sunk; and from this the depth could be calculated. Of course, the apparatus would have to be made expressly, and of such strength as to register the pressure at immense depths.

I am, Gentlemen, yours, &c.,

Peter Hart.

Manchester, Dec. 14, 1857.

STONE-PLANING MACHINES.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I have been a constant subscriber to the *Mechanics' Magazine* for more than twenty years. Will you allow me to ask, through you, some of your intelligent readers what has become of Hunter's patent Stone-Planing Machine referred to in your 23rd vol., May, 1835?—and if his, or any similar machine is at work at present, could they inform me where it may be seen?—and you will much oblige an old friend.

I am, Gentlemen, yours, &c.,

Thos. Langan.

Dec. 9, 1857.

IGNITER FOR FOG SIGNALS.

To the Editors of the Mechanics' Magazine.

Gentlemen,—I have observed that the three nipples placed within the tin fog signals, are, from want of a solid foundation, liable to be overturned on their sides by the wheel of the engine pressing against them, and they become liable to misfire. I make my *single* nipple to receive the percussion cap, of cast iron, with a broad base; this ensures its standing *upright* under the engine wheel; and, to prevent its rusting, or the cap being injured by verdigris, from the nature of the surrounding explosive powder, I varnish both cap and broad-bottomed nipple with shell-lac varnish.

I am, Gentlemen, yours, &c.,

J. Norton.

12th Dec.

IMPROVED ÆOLIAN HARP.

To the Editors of the Mechanics' Magazine.

Gentlemen,—The following addition to this delightful instrument will render it effective when placed in the sun or subjected to other heat. Provide a leather case, which should be so made as to join the harp in the form of a trough, extending from one end of it to the other. This case must be air-tight, and have at its furthest extremity a valve opening inwards. Now the sun expanding the air contained in the case will cause it to act upon the harp, while the pressure of the external atmosphere will open the valve and thus supply the case.

It is of course possible that a metallic globe would act much better than a case of this sort, and, as far as the conduction of heat and the consequent rapidity of the music is concerned, this I think could not fail to be an improvement.

I am, Gentlemen, yours, &c.,

J. A. D.

MISCELLANEOUS INTELLIGENCE.

Institution of Engineers in Scotland—Session 1857-58.—The Institution of Engineers in Scotland will meet in the Philosophical Society's Hall, George-street, on Wednesday, the 23rd December, at eight o'clock in the evening. New members and graduates will be balloted for, and papers will be read:—"On Pumping-Engine Valves," by Mr. D. Mackain. "On Pumping-Engine Valves," by Mr. W.

Neilson. "On a System of Decimal Measures," by Mr. J. Simon Holland. "On Decimal Measures," by Mr. W. Neilson. "On a Speed Governor," by Mr. G. H. Smith.

Agricultural Implements.—On Wednesday, Dec. 9th, a most interesting paper was read at the Society of Arts, on "The Progress of the Agricultural Implement Trade during the last Twenty Years," by S. Sidney, Esq. He confined himself to the period which has elapsed since 1837, because during that period four circumstances,—viz., the importation of guano, the manufacture of superphosphate of lime, and other artificial portable manures, the promulgation and general acceptation of Mr. Josiah Parkes' system of deep thorough drainage, the extension of the railway system, and the Annual exhibitions of the Royal Agricultural and Local Agricultural Societies,—have combined to raise the mechanical perfection only to be obtained under the factory system, and to bring into common use a number of implements and machines which had long ago been invented and described in quarto volumes, some of which had been in use in one or two counties, but which in 1837, were generally considered as curious useless toys. He gave a very able review of the plough, the harrow, cultivators and scarifiers, rollers, sowing-machines, horse-hoes, harvesting-machines, threshing-machines, portable steam-engines, steam-ploughs, root-slicers, pulpers, chaff-cutters, &c., &c. A full report of the paper, and of the discussion which followed it, is given in the *Journal of the Society of Arts* for December 11.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

Ross, W. *Improvements in apparatus for regulating the passage of fluids.* Dated Mar. 27, 1857. (No. 863.)

This invention consists of a peculiar adaptation of a hollow, flexible, and fluid-tight bag of India rubber in the interior of a spherical metal case, and combined with certain pipes, stop-cocks, and valves.

Thomson, D. *Improvements in rotary pumps.* Dated Mar. 28, 1857. (No. 864.)

The patentee constructs centrifugal pumps with blades prolonged to approach to, or join the central shaft of the pump, and made of a screw or spiral form at that part. He also extends these screw blades beyond the centrifugal wheel into the suction pipe or inlets of the pump case. The fluid is thus gradually drawn or guided into the wheel.

Jossa, F. *Improvements in furnaces and ovens for the prevention of smoke and for economy of fuel.* Dated Mar. 28, 1857. (No. 866.)

The principal features here are the use of a metal shoot at the side of the furnace, into which the fuel is placed, and from which an inclined channel is formed, whence the fuel falls partly below the boiler on to a fire-proof chamber, when it is subjected to dry distillation. The gases evolved therefrom are conveyed under the boiler, and serve to heat it. The coke falls through on to the fire bars, and is consumed without smoke.

Girard, H. B. *Improvements in insulating telegraphic wires or conductors, and in apparatus for stretching such wires.* Dated Mar. 28, 1857. (No. 869.)

The inventor insulates telegraph wires by two coatings, the first composed of graphite or plumbago, and glue or size—the second of two parts:—1. Linseed oil rendered siccative, flour of sulphur, and gutta percha. 2. Orcausson and tar. To insulate suspended wires without taking them down, the patentee constructs a travelling cage, in which the coating is kept hot by lamps carried by the cage. The cage is suspended from wires, and is drawn along the wire to be insulated. The apparatus for stretching wires consists of a disc of non-conducting material on a metal axis, on one end of which is a ratchet wheel, and on the other a handle; a paul from the post takes in the ratchet wheel. The end of a wire leading in one direction is connected to one side of the disc, and the end of another wire leading in the contrary direction is connected to the opposite side of the disc, so that on turning the handle both wires are stretched at the same time.

Deplanque, L. E. *An improved composition for sharpening and setting fine-edged cutting instruments.* Dated Mar. 28, 1857. (No. 870.)

This is a combination of vulcanised caoutchouc with vegetable and mineral substances.

Neild, A., and N. B. Sutcliffe. *Improvements in treating or cleansing certain descriptions of cotton waste.* Dated Mar. 30, 1857. (No. 873.)

The patentee submits cotton waste to the action of a hot alkaline solution, for separating the oil, grease, &c., from the fibres. They find that an apparatus similar to a bleacher's kier is well adapted for the purpose, and that a solution made with 10 lbs. of soda ash is sufficient for cleansing 100 lbs. of cotton waste. The liquid is forced up through a central pipe by means of steam.

Jack, D. *Improvements in washing or cleansing textile fabrics and materials.* Dated Mar. 30, 1857. (No. 875.)

An essential feature here is the exposure of the fabrics in a stretched state to a

cleansing liquid, forced against them by the centrifugal action of revolving hollow bladed water throwers, supplied with the liquid through their shafts.

SCOTT, J. *Improvements in bottles, and their stoppering or closing details.* Dated Mar. 30, 1857. (No. 876.)

Here the work of the bottle-maker is entirely dispensed with, no thickened lip or ring being formed upon the spout end, and the bottle is complete when it leaves the mould in which it is blown, with the exception of breaking off any superfluous glass from the spout end. The mould is so constructed that when the bottle leaves it the extreme end of the neck or spout is narrower than the neck nearer the body of the bottle, there being a shoulder where the wider part is joined to the narrower part.

CHILDS, W., jun. *Improvements in the construction of expansible boxes, cases, and receptacles.* Dated Mar. 30, 1857. (No. 877.)

This consists in constructing the sides or backs of boxes, cases, purses, &c., of two or more parts, capable of sliding over each other, and of being expanded by means of screws, and fixed in the position required by set screws.

JOHNSON, J. H. *Improvements in warming and ventilating apartments.* (A communication.) Dated Mar. 30, 1857. (No. 879.)

Here a peculiar apparatus is employed for drawing a body of cold pure air from outside the building, for heating this air, and discharging it near the ceiling, whilst it extracts from the apartment all impure air, and causes them to pass off to the chimney.

D'ARCET, J. E. *Improvements in distilling and rectifying tar, resins, oils, turpentine, bitumen, and other matters, and in the apparatus for the same.* Dated Mar. 31, 1857. (No. 882.)

The chief object here is to obtain a continuous distillation analogous to the distillation of alcoholic liquids, and at the same time to heat the substances to be distilled as little as possible. This process is based—1. On the continuity of the operation of distillation or rectification, produced by gradual increments of temperature. 2. On the spontaneous separation of the volatile products arising from these operations.

HAMILTON, G. *Improvements in the treatment or finishing of woven fabrics.* Dated Mar. 31, 1857. (No. 886.)

Here the object is to impart an elastic or soft finish, which effect is produced by working the threads over each other whilst in the act of drying after treatment with starch, &c. The invention consists essentially in holding or nipping the fabric across its width, and in working the threads angularly over each other by means of this transverse hold or nip.

GOODE, S. J. *An improvement or improvements in depositing metallic alloys by electricity.* Dated Mar. 31, 1857. (No. 887.)

This consists in connecting with the copper or other negative element of the voltaic battery used for depositing metallic alloys, separate plates of metals composing the alloy to be deposited, so as to control the composition from which the alloy is being deposited.

GRAHAM, J. *An improved steering apparatus.* Dated Mar. 31, 1857. (No. 891.)

The rotary motion of the steering wheel is transmitted by a chain (kept taut by a guide pulley) to a chain-wheel below the poop deck. The wheel is mounted on a worm-shaft, the worm of which drives a worm-wheel loose on a fixed spindle. This spindle is bolted fast to the deck beams. To this worm wheel is attached a double-grooved eccentric pulley, which receives the chain from the tiller, and causes the rudder to turn on its axis.

WRIGHT, R. A., and L. J. FOUCHÉ. *A new apparatus destined to produce chemical decompositions by means of superheated steam and water.* Dated Apr. 1, 1857. (No. 894.)

A first boiler, heated by the source of heat, contains the water. A second heated by the highly-heated water, or steam from the first boiler, contains the water and the fatty substance to be operated upon. The two boilers being put in communication by tubes, an automatic continuous current necessary to produce the chemical action is generated by water alone.

PAUL, B. H. *Improvements in the preservation of stone, either natural or artificial, also of cements and other similar compositions.* Dated Apr. 1, 1857. (No. 897.)

This consists in applying to the stone, &c., solutions of aluminates (of soda, potash, &c.), also of the zincates (of soda or potash), or phosphates of alumina, or zinc in solution by alkalis; also similar preparations of lead or molybdenum. These are employed either alone or mixed with finely powdered silica, carbonate of magnesia, baryta, or zinc, sulphate of baryta, French chalk, &c.

ADAM, R. *Improvements in preparing and finishing threads or yarns.* Dated Apr. 1, 1857. (No. 901.)

This relates to machinery for preparing, polishing, and finishing threads or yarns, particularly sewing cotton, the object being the obtainment of a superior polishing or finishing action upon the threads. The invention cannot be intelligibly described without engravings.

SMITH, W. *Improvements in the manufacture or production of ornamental fabrics.* Dated Apr. 1, 1857. (No. 902.)

This consists in producing fabrics having two distinct patterns one upon each side of the cloth, or the same pattern on each side of the fabric, but with reversed colours. It cannot be described without engravings.

WARDELL, R. *Certain improvements in reaping machines.* Dated Apr. 1, 1857. (No. 904.)

This relates to certain modifications of that part of the platforms of reaping machines known as the side delivery, the object being the delivery of the corn at right angles, or nearly so, to the knives of the machine, either in "swathe" or in "sheaf," at the option of the farmer.

SMITH, H. *Improvements in chaff cutting machines.* Dated Apr. 1, 1857. (No. 906.)

This relates to the adaptation to chaff cutting machines of certain improvements, which prevent their becoming choked and injured by the accumulation of an excess of feed, and facilitate the delivery of the straw to the cutting blades on the fly-wheel.

NEWTON, A. V. *Certain improvements in fire-arms.* (A communication.) Dated Apr. 1, 1857. (No. 907.)

This consists in a mode of applying a moveable charge chamber to breech-loading fire-arms, and in contrivances employed in combination therewith as auxiliaries, for preventing the parting of the joint between the chamber and the barrel by the force of the explosion of the charge, and causing the force of the explosion to close the joint tighter, and for preventing the wearing loose of the joint.

OLIVER, J. *Improvements in apparatus for manufacturing and conveying sulphuric acid.* Dated Apr. 1, 1857. (No. 909.)

This consists, 1st, of an improved mode of generating and disposing of the constituent elements of sulphuric acid. This part cannot be described without engravings. The 2nd part has for its object increased facilities for packing, conveying, and delivering sulphuric acid, by means of ron vessels lined with lead, adapted to barges and railway trucks, such vessels being fitted with a pendent or syphon tube, with the necessary fittings to effect a union and detachment to an air pump by which they are to be discharged or charged.

LOWRY, G. *Certain improvements in machinery for heckling flax and other fibrous materials.* Dated Apr. 2, 1857. (No. 911.)

This is applicable to sheet and other heckling machines, and consists—1. In imparting a to and fro or up and down motion to the upper rollers and guides over which the sheets, bolts, or chains of heckles are conveyed. 2. In a mode of fixing the heckles and heckle bars on sheet machines, so as to cause the points of the heckles to strike or rise up at, or nearly at, right angles with the strick of flax.

LAURECISQUE, F. A. *An improved system of constructing dissected maps or charts.* Dated Apr. 2, 1857. (No. 912.)

This consists in forming dissected maps, &c., by means of superposed layers of wood, cardboard, &c., which layers are kept in their proper position by brackets or projecting edges.

MORRISON, D., and S. LILLEY. *An improvement or improvements in locks.* Dated Apr. 2, 1857. (No. 916.)

This consists in inserting in the lock that portion of the key which acts upon the lock, and causing the acting portion of the key to be left in and close the keyhole on the withdrawal of the moveable key; which latter, on entering the lock, engages with the moveable portion, and liberates it from the keyhole before it can act upon the bolt of the lock, the moveable key also fixing the acting portion of the key in the keyhole before the moveable key can be withdrawn.

MAW, E. *An improvement in the points of railway crossings.* Dated Apr. 2, 1857. (No. 917.)

This consists of applying fish plates in combination with a steel point where the two rails of a railway crossing come together. The point, made up of steel, butts against the ends of the two rails where they come together, and the steel point and the two ends of the two rails are fixed together by two fish plates, one on either side, screw bolts being passed through the fish plates, and through the steel point, and also through the fish plates and the two ends of the rails, by which means, and by screw nuts the whole are connected together.

OTWAY, R. *An improvement in scythes.* Dated Apr. 2, 1857. (No. 918.)

This invention was described and illustrated at p. 556 of our last number.

BROOMAN, R. A. *A steam windlass and boiler for the same, together with certain modifications to enable the windlass to be worked by hand.* (A communication.) Dated Apr. 2, 1857. (No. 920.)

This invention is described at page 588 of this number.

NEWTON, A. V. *Improvements in repeating fire-arms.* (A communication.) Dated Apr. 2, 1857. (No. 921.)

The object here is to provide for greater convenience, quickness, and certainty in the operations of loading and firing when in action on horseback or in a boat; and also to avoid the fouling of the lock by the smoke and gas resulting from the discharge. The improvements require engravings to illustrate them.

Box, W. H. *An improved fish-hook.* Dated Apr. 3, 1857. (No. 923.)

This refers—1. To the electro-plating of fish-hooks generally. 2. To the peculiar mechanical application of a double swivel to fish-hooks, to the box of which the hook is directly attached by means of a hook or pin-like head.

Brooman, R. A. *A machine for the manufacture of bolts and rivets.* (A communication.) Dated Apr. 3, 1857. (No. 927.)

This machine operates as follows:—A bar of red hot iron is fed into one of four matrices; a matrix holder wheel is caused to rotate one-fourth of a revolution, and the iron being brought against a cutting chisel is cut off to a proper length. The matrix holder then performs another quarter of a revolution, which brings the bar of iron opposite to a head-forming stamp on one side, and a pressure screw to resist the pressure on the opposite side. When opposite to it the stamp performs its stroke, and shapes the head of the bolt or rivet. As soon as the stamp commences its back stroke the matrix holder performs the third quarter of its revolution, and brings the now formed bolt or rivet opposite to a clearing rod, which advances and pushes the bolt or rivet head-first out of the matrix. The clearer then returns, when the matrix holder performs the remaining quarter revolution, and brings round the empty matrix to be fed with iron as before, and the operations are repeated.

Smith, J. *Improvements in machinery or apparatus used in the manufacture of brushes for flour dressing machines.* Dated Apr. 3, 1857. (No. 928.)

The patentee places the bristles on a board in two parts longitudinally, of the length the brush is required, and transfers the board to the machine, which has a longitudinal groove formed by a moveable jaw. The bristles being placed across the groove, he passes a cord over them, and over the groove; a bar is then caused to descend upon the cord, and press it with the bristles partially into the slot. The board is then withdrawn, and glue is introduced into the gutter thus formed by the bar, which bar is then further pressed down into the slot until the bristles are doubled up at each side of the bar, and are held in that doubled position until the bar is withdrawn. A pair of clamps are then applied to the whole length of the bristles, and tightened up to keep them in position to be removed from the machine.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

Beaumont, E. B. *Improvements in lamps and apparatus used in coal mines.* Dated Mar. 28, 1857. (No. 867.)

In constructing miners' lamps, there is a lens employed on one side consisting of glass and water, so arranged that should the glass be broken, the water shall flow to the wick and extinguish the flame, and in order to indicate the state of the air in a mine, an instrument is used consisting of a light vessel containing gas lighter than a like bulk of an atmosphere which is safe to work in. This vessel is connected to a pointer or indicator, so that when the atmosphere surrounding the instrument becomes unsafe by the admixture of gas, the vessel will by its descent indicate that the atmosphere around is not safe.

Russel, R. *Improvements in railway turntables.* Dated Mar. 28, 1857. (No. 868.)

Each turntable is constructed thus:—Two beams are made each with two recesses or cranks in them, in which are placed two upper beams, so that the upper surfaces of the four beams are all in the same plane, the upper beams being at right angles to the lower beams. The rails are fixed on the beams, and the table is plated or planked over. Each turntable is supported by four wheels, between the beams, there being a suitable circular rail for the wheels to run on under the table. The table may be connected with and turn on a central post.

Thursfield, J. *An improved water-ram for raising water.* Dated Mar. 28, 1857. (No. 872.)

This consists in combining a small vessel with an ordinary water ram, for the purpose of supplying a feed of pure water from the ram to a considerable distance and height, notwithstanding the ram is worked by unclean or foul water.

Taylor, J. H. *Improvements in apparatus for regulating the flow of fluids, applicable to water-closets and other similar purposes.* Dated Mar. 30, 1857. (No. 874.)

This apparatus cannot well be described without illustrations.

Cudworth, J. J. *Improvements in locomotive boiler furnaces.* Dated Mar. 30, 1857. (No. 878.)

Here the fire-bars are placed at a considerable angle, so that the fuel will slide down as it is burnt, and to facilitate the getting rid of clinkers the bars admit of being lowered. The peculiarity consists in combining with such fire-bars a constant jet of steam through the chimney, obtained by opening a passage from the boiler when the engines are not at work, and closing such passage when the escape of steam from the engines supplies the requisite jet.

Thomas, R. H *mproved machinery for*

converting plastic substances into spherical forms or balls. Dated Mar. 30, 1857. (No. 880.)

Here plastic substances are first rolled into a cylindrical form and then cut up by grooved rollers into small pieces, which pieces are converted by rotating semi-circular grooved surfaces into round balls.

GRANGER, A. *An improved manufacture of safety envelope.* Dated Mar. 30, 1857. (No. 881.)

The inventor employs a "tuck" fastening, the upper or seal flap being formed with a tongue, which is cemented on its inner face, and is passed through a slot in the pocket flap, to bring the cemented surface into contact with the side flaps which lie beneath it.

FRANCIS, H. *Improvements in machinery for ploughing and working land.* Dated Mar. 31, 1857. (No. 884.)

This consists in working ploughs, drillers, rollers, &c., by attaching them to an engine constructed to travel by its own or other power, and which moves the implements transversely to the direction of its progress, by means of a lever working on a fulcrum beneath the body of the engine, the implements being attached to the outer end of the lever which projects beyond the wheels carrying the engine, and to which lever a vibrating motion is communicated.

EVANS, J. C. *Improvements in railway rolling stock.* Dated Mar. 31, 1857. (No. 885.)

This relates—1. To actuating railway brakes, and consists in the application of a spirally grooved cone, fitted on to an axle of the carriage, and caused to rotate therewith. This grooved cone actuates a break lever which supplies the brakes, the blocks of which may be of the ordinary construction.—2. It relates to the couplings, and consists in the use of a ball and socket joint, in combination with India rubber, for ensuring a direct pull upon the hooks and deadening sudden shocks or jars.

HILLS, F. C. *Improvements in manufacturing gas, and in apparatus connected therewith.* Dated Mar. 31, 1857. (No. 888.)

The object here is—1. To prevent the escape of smoke, &c., into the retort house, and this the inventor effects by placing a hood in front of the mouthpiece of each retort, which hood should rise a few inches above the top of the retort, but having the front of the hood as low as the inside top of the retort, so as to form an inverted box or pocket to receive the smoke, &c., and pass them off by a pipe at the top. 2. To prevent tar or tarry matter from being deposited in the mouthpiece of the retorts. The bottom of the mouthpiece is made to slope inwards from the door to the red hot part of the retort, so that any tar that may condense in the ascension pipe or mouthpiece will run down the inclined plane from the door on to the red hot part of the retort, and be converted into coke or cinder. 3rd. To cool the coke with lime water, which will prevent the escape of sulphuretted hydrogen and sulphurous acid gas.

LAUDER, G., and T. IRELAND. *Improvements in the manufacture of brine to be used in the manufacture of salt.* Dated Mar. 31, 1857. (No. 889.)

This relates to a mode of evaporating saline liquids for the manufacture of common salt, by means of a series of evaporators, which are successively heated by the steam proceeding from the preceding one of the series.

WRIGHT, J. *An improved method of bleaching straw plait and straw.* (A communication.) Dated Mar. 31, 1857. (No. 890.)

The inventor first soaks (for from twenty-four to seventy-one hours) the plait in a bath saturated with soda of commerce and chloride of lime, then rinses and dries it and exposes it to the fumes of sulphur, or to sulphurous acid gas for from one to six hours.

GLOVER, W. *Improvements in looms for weaving.* Dated Mar. 31, 1857. (No. 892.)

1. For regulating the speed of the beating-up motion in looms—to retard it at certain periods, and hasten it at others—the inventor employs mechanism between the crank and the reed, which will fail in communicating the motion at required periods. 2. For passing the shuttle between the warp threads he employs shuttle carriers, one on either side of the warp, which advance towards and recede from the centre, during which motions the shuttle is carried in by one and transferred to the other for being passed between the remaining portion of the warp threads. 3. To effect the beating-up motion he introduces a wedge-formed apparatus in the shed between the warp threads from the side or sides thereof.

DURANT, A. H. A. *Certain improvements in omnibuses.* Dated Mar. 31, 1857. (No. 893.)

This consists—1. In a mode of applying a drag to an omnibus. 2. In affording more space between the seats in omnibuses than heretofore without increasing the width of the omnibus. 3. In establishing a communication between the conductor and the passengers. 4. In the adaptation to omnibuses of three wheels in combination with double doors, and a drag operating upon the hindermost of the three wheels, or upon any one or more of four wheels. 5. In the application of an elastic material to various parts of omnibuses to prevent noise,

ILES, C. *Improvements in bolts for doors.* Dated Apr. 1, 1857. (No. 895.)

This consists—1. Of an improvement by which the bolt is thrown in or out of fastening. The handle of the bolt works in a spiral slot in the frame in which the bolt is enclosed. When the handle is raised or lowered, so as to give a partial rotation to the bolt, the bolt is made to advance into or retire from the staple with which it engages. 2. In coating the cases, and making parts of the handles of door bolts of vitreous or semi-vitreous, or of plastic materials which harden by drying.

BURTON, W. S. *A new or improved manufacture of rollers or cylinders for printing fabrics.* Dated Apr. 1, 1857. (No. 896.)

The inventor takes a hollow tube of copper, and in the interior of it he places an iron or other tube, the latter being situated concentrically with the former. The two are secured together by annular ends, which close up the space between the two tubes. Between the tubes a solid or liquid support may be introduced, or he merely encloses air between the tubes.

GREVES, C. *Improvements in breech-loading guns and pistols.* Dated Apr. 1, 1857. (No. 899.)

This consists of fitting to the end of the barrel a piece of metal of a conical form, over which the breech of the gun is made to slide, and is held by a spring. When the gun is to be used the spring is pressed, by which the barrel is released, and an opening exposed for the reception of the cartridge.

LESLIE, J. *Improvements in the treatment of wash waters containing soap, oils, saponified or saponifiable matters for the obtainment of products therefrom.* (A communication.) Dated Apr. 1, 1857. (No. 900.)

Here the wash water is run into a boiler, where it is heated, and sulphuric acid or other chemical agent is added to it. This causes the oily or greasy matter to collect as a scum on the surface of the fluid when it is cooled down. The under fluid is then run off, and the oily or greasy matter thus separated. This matter is then subjected to the action of heat, caustic potass being added. This effects its refinement.

PERIN, L. *The easy discovery of flaws and escapes in gas pipes.* Dated Apr. 1, 1857. (No. 903.)

The apparatus employed is a tight vessel of copper or glass communicating with any range of gas pipes, by means of a tube and a curved glass pipe, partially filled with quicksilver, one arm of which pipe communicates with the gas pipe to which the vessel is joined, and the other arm left open. This apparatus will test whether the gas pipes have any communication with the outer air through a crack, or by a tap being left open, or the contrary—by means of heat applied to the receiver, after the tap connecting the pipes to be examined with the meter or main has been closed. The heat will expand the air or gas contained in the receiver and pipes, and cause it to rush from any opening that may exist. If no escape exist, it will press upon the quicksilver in the glass pipe, and cause it to rise in the arm open to the outer air.

SUGDEN, J. *Improvements in the manufacture of combs for combing wool, silk, cotton, flax, or other fibrous materials.* Dated Apr. 1, 1857. (No. 905.)

This relates to the manufacture of combs in which the teeth are set in circles or segments of circles. The inventor prepares the pins or teeth; and, having arranged them in a holder in a line corresponding to the form which they are to take in the comb, he secures them in that position by casting molten metal around the roots of the pins or teeth. He also casts the combs in segments, which, when combined, form a complete comb.

CROSSLEY, J. *Improvements in machinery for smoothing glass.* Dated Apr. 1, 1857. (No. 908.)

Here the axis of the smoothing runner is caused to move from end to end of the table on which the glass is fixed by means of a screw which passes through a nut fixed to the axis of the runner; such screw receiving rotary motion by suitable gearing first in one direction and then in the other. The axis of the runner also receives rotary motion, first in one direction and then in the other, by means of a toothed wheel on the axis, which comes alternately into action with a succession of racks, at intervals apart, and on opposite sides of the frame.

MARTIN, R., and J. W. SUTTON. *Improvements in the means of giving alarm in dwelling-houses and other buildings in cases of robbery, fire, or other emergencies.* Dated Apr. 1, 1857. (No. 910.)

This consists in adapting certain self-acting mechanical arrangements, in combination with caps containing fulminating powder to the doors and other parts of buildings.

WIELAND, J. F. *Improvements in portable apparatus and materials for cleaning the teeth.* Dated Apr. 2, 1857. (No. 913.)

Under one modification of this apparatus it takes the form of a short cylindrical tubular case or holder of ivory, bone, &c. This case is solid at one end, whilst the other end has a deep head cap screwed upon it. When this head cap is screwed off it discloses the tooth brush contained within it.

PROVISIONAL PROTECTIONS.

Dated September 18, 1857.

2417. John May Munro, jun., of Bristol. An improved metal wheel-stock.

Dated November 9, 1857.

2831. Alphonse René la Mire de Normandy, of Judd-street, Brunswick-square, analytical chemist. Improvements in the manufacture of soap.

Dated November 10, 1857.

2836. William Devon, of Maryland-terrace, Stratford. An improved self-acting apparatus for flushing water-closets, and the means of connecting the same to water mains, parts of which are applicable to the junction of gas or water pipes generally.

Dated November 13, 1857.

2859. George Sheppard, of Fordingbridge, Hants, engineer. Improved machinery for cultivating land, or for cutting up and pulverizing the surface thereof.

Dated November 16, 1857.

2872. Casimir Debax-Talabas, of Castres, France, lithographic printer. Improvements in lithographic printing presses.

2874. John Frederick Spencer, of Brighton, marine engineer. Certain improvements in steam engines, and in the apparatus connected therewith.

2876. Thomas Richardson, of Newcastle-on-Tyne. An improvement in treating manganese ores.

Dated November 17, 1857.

2878. William Gossage, of Widnes, Lancaster, chemist. Improvements in the manufacture of certain kinds of soap.

2880. Daniel Foxwell, of Manchester, card manufacturer. The application of a certain material for the backs of cards.

2882. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in fire-arms, and in detonating compounds to be used therewith. A communication.

2884. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. The manufacture upon circular frames of a fabric suitable for petticoats and other garments, and curtains and other articles of furniture, together with apparatus to be employed therein. A communication from Mons. Luce Villiard.

2886. William Eardly Richardes, of Bryn-Eithin, South Wales, Esq. An improved war weapon.

Dated November 18, 1857.

2888. William Howard Bell, of Pelton, Durham. Improvements in the permanent way of railways.

2890. Emile Alcan, of Fore-street, London. An apparatus to be applied to looms for producing figured fabrics of all kinds. A communication.

2892. Andrew Frederick Germann, Frederick Gustavus Germann, and Joseph Germann. An improved propeller.

2894. Robert Clegg, of Islington, gentleman. Improvements in registering or indicating apparatus applicable to the registration or indication of fares, the distances passed over by vehicles, the revolutions of machines or parts of machines, and other similar purposes.

2896. Philip Bettle, of Ely-place, watchmaker. An improvement in the construction of watches.

Dated November 19, 1857.

2897. William Smith, of Norton, York. An apparatus for the purpose of protecting the turnip crop by destroying the turnip fly and other insects which are injurious to turnips and other plants.

2898. Charles Wye Williams, of Liverpool, gentleman. Improvements in steam engine boilers.

2900. Jean Baptiste Mirlo, of Paris, iron merchant. Improvements in the permanent way of railways. A communication from M. Pluchet, of Paris.

2902. The Rev. Theophilus Henry Hastings Kelk, of Tonge, Leicester, clerk. Improved metallic alloys.

2904. William Clay, of Liverpool, iron manufacturer. Improvements in metal knees employed in the construction of ships, buildings, railway or other waggons or carriages or other analogous purposes.

2907. Reinhold Goedicke, chemist, of John-street, Bedford-row. The suspending of the lines of electric telegraphs in the air by means of gas balloons, across water and land, or the atmospheric telegraph.

2908. David Melvin, of Glasgow, card manufacturer. Improvements in machinery or apparatus for manufacturing heddles or healds for weaving.

2910. John Edmund Burningham Curtis, of St. James-road, Croydon. Improvements in apparatus for filing papers and documents.

2912. Thomas Frederick Brabson, of Birmingham, brass-founder, and George Hughes, of Yardley, Worcester, merchant's clerk. Improvements in door springs.

2913. William James Cantelo, of Camberwell, gentleman. Improvements in the preparation and application of graves or cracklings for the purposes of animal food and manure.

2914. Benjamin Keightley, of Lofthouse, Wakefield, coal viewer. An improved apparatus for indicating and registering the flow or supply of air to mines and other places requiring ventilation.

Dated November 20, 1857.

2916. John Hinks and George Wells, of Birmingham, manufacturers, and Joseph Letiere Petit, of Aston, near Birmingham, tool maker. An improvement or improvements in metallic pens.

2918. Henry Walker, of Mirfield, York, manufacturer, James Beaumont, of the same place, engineer, and Joseph Gothard, of Huddersfield, mechanic. Improvements in steam engines.

2919. Henry Page, of Whitechapel-road, lead and glass merchant. Improvements in the manufacture of sheet and crown glass.

2920. Pierre Alphonse Brussaut, of Mont de Marsan, France, engineer. An improved anti-friction apparatus for shafts, axles, and other revolving surfaces.

Dated November 21, 1857.

2922. William Archibald Cooper, of Dungannon, Ireland, railway contractor. Improvements in the navigation of steam and other vessels.

2924. Napoleon Felix Boreiko de Chodzko, of Paris, civil engineer. Improvements in furnaces for heating boilers.

2926. Samuel Hall, of King's Arms-yard, Moorgate-street, civil engineer. An improvement in apparatus for igniting matches and other articles.

2928. James Wright, of Alfred-place, Newington-causeway, civil engineer. Improvements in the mode of treating madder for printing, dyeing, and distilling purposes, and also in the preparation and treatment of silk, cotton, and woollen cloth for printing and dyeing. A communication.

Dated November 23, 1857.

2930. Walter McFarlane, of Glasgow, engineer. Improvements in moulding or manufacturing cast iron pipes and other generally similar hollow articles.

2932. Charles Barlow, of Chancery-lane. Improvements in steam and air engines and furnaces therefor. A communication.

2934. David Hulett, of High Holborn. Im-

provements in cocks, taps, and valves, and in joints for pipes and tubes.

Dated November 24, 1857.

2936. Thomas Coxon Wilkinson, of Ashford, Kent, engineer. Improvements in pump valves.

2937. Joseph Schloss, of Cannon-street West, City, merchant. A so-called Diana lock or improved fastening.

2938. George Lowry, of Salford, Lancaster, machinist. Certain improvements in machinery for heckling flax and other fibrous materials.

2939. William Searby, of Newgate-street, engraver. An improved form of elastic spring, applicable to bedsteads, sofas, chairs, the padding and seats of carriages, and other similar purposes. A communication.

2940. Charles Sands, of Felix-terrace, Liverpool-road, licensed victualler. Improvements in stereoscopes.

2941. Augustus Frederick Butler, of Ceylon. Improvements in machinery for pulping coffee.

Dated November 25, 1857.

2943. Robert Willan, James Abbott, and Daniel Mills, all of Blackburn. Improvements in looms.

2945. Antoine and Jean Martin, of Trieste, Austria, merchants. Improvements in cleaning, and in preventing the formation of deposits and incrustations in steam boilers.

2947. James Hogg, of London, civil engineer. An improved safe or depository for cash, deeds, or other valuables.

Dated November 26, 1857.

2949. William Thomas Manning, of Great George-street, Westminster, gentleman. Improvements in the treatment of sewerage, and in the apparatus employed therein.

2951. Charles Farrow, of Great Tower-street. An improvement in fire-arms.

2953. Henry Woodward, of Birmingham, commercial agent. A new or improved knife cleaner.

2955. James Higham and George David Bellamy, of Plymouth, soap manufacturers. An improvement in the manufacture of soap.

Dated November 27, 1857.

2957. Thomas Wheeler, of the Albion Works, Oxford, engineer. Improvements in machinery or apparatus for cutting turnips and other roots.

2959. William Elcock, of Wednesbury, Stafford, manufacturer, and Samuel Bentley, of Wednesbury, smith. Improvements in elbows used for joining wrought iron and other pipes or tubes, and in tools for manufacturing the said elbows.

Dated November 28, 1857.

2961. Arthur Vandeleur, of the Royal Arsenal, Woolwich, Major R.A. Improvements in the construction of fire-places and passages for air of air furnaces, by which (without machinery) the intensity of the fire is increased, a saving of fuel effected, and the smoke consumed.

2963. Marc Antoine François Mennons, of Rue de l'Echiquier, Paris. An improved "tell-tale clock" or time keeper. A communication.

2965. William Binns, of Victoria-grove, Brompton, consulting engineer. Certain improvements in the treatment and application of surcharged or superheated steam.

2967. William Massey, of Newport, Salop, engineer. Improvements in guides or conductors to be applied to machinery or apparatus employed for winding or coiling chains, ropes, lines, thread, wire, or other similar articles.

Dated November 30, 1857.

2969. Joseph Gardner and Richard Lee, of Liverpool, mast-makers, and Henry George Pearce, of the same place, master mariner. Improvements for self-reefing sails.

2971. Henry Deacon, of the Woodend Chemical Works, Widnes Dock, near Warrington, manufacturing chemist. Improvements in apparatus employed in the manufacture or production of caustic soda from liquors obtained in the manufacture of alkali, and applicable also to the manufacture or production of soap.

2973. John Palmer De la Fons, of Carlton-hill, St. John's Wood. Improvements in apparatus for retarding omnibuses and other carriages.

2975. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., Editor of the *Mechanics' Magazine*, and patent agent. Improvements in casks and other vessels for containing liquids. A communication from André Zoubschaninoff.

2977. Charles Goodyear, of Leicester-square, gentleman. Improvements in the manufacture of buoyant fabrics, which are applicable to the manufacture of garments, carpets, rugs, cushions, mattresses, bags, and various other useful articles.

2979. Alfred Vincent Newton, of Chancery-lane, mechanical draughtsman. Improved machinery for cleaning carpets and other fabrics. A communication.

2981. Simon Solomon, of Wood-street, Spitalfields, umbrella manufacturer. Improvements in umbrella, parasol, and walking sticks or canes.

Dated December 1, 1857.

2983. Frederic George Spray, of London, engineer. Improvements in the manufacture of gunpowder.

2985. Denny Lane, of Cork, secretary of the Cork Gas Company. Improvements in lighting, regulating, and extinguishing street and other gas lamps, by means of electricity.

PATENT APPLIED FOR WITH COMPLETE SPECIFICATION.

3023. Frederick Oldfield Ward, of Cork-street, Burlington-gardens. Improvements in manufacturing manure and obtaining accessory products. Partly a communication from F. Wynants, of Belgium. Dated 5th December, 1857.

NOTICES OF INTENTION TO PROCEED.

(*From the "London Gazette," December* 15, 1857.)

2089. G. Inman. An improved construction of locomotive engine.

2096. E. Maw. Improvements in constructing railway crossings, points, and switches.

2103. R. Davison and J. Lee. Improving the edge or selvage of linen, cotton, woollen, silk, or any other cloth or fabric while in the act of weaving.

2108. A. Prince. A substitute for varnish, turpentine, and oil, in the manufacture or mixing of paints and pigments to be employed for coating or covering wood, metal, glass, and other substances, to preserve them from atmospheric influences and fire. A communication.

2115. J. Littlewood and A. Schlumberger. Improvements in producing printed or dyed colours from murexide on woollen fabrics, or yarns or mixed fabrics, or yarns of wool and cotton.

2124. E. Rowland. Certain improvements in steam engines.

2125. W. Gilmour. Improvements in obtaining motive power.

2134. J. Lanford and J. Wilder. Improvements in signals and alarums.

2138. T. G. Shaw. Improvements in machinery for thrashing and separating wheat and other grain.

2143. A. H. Renton. Improvements in apparatus for steering vessels. A communication.

2151. R. Wagstaff. Certain improvements in machinery or apparatus for digging land.

2152. R. Wagstaff. Certain improvements in locomotive engines to be employed on common roads or ways, applicable to agricultural and other similar purposes.

2161. W. E. Newton. Improved machinery for cutting files. A communication.

2164. J. Parkinson. Improvements in the construction of pressure and vacuum gauges.

2169. S. Draper. Improvements in the manufacture of handles and fastenings for doors of railway and other carriages.

2170. S. Clift. Improvements in the purification of certain gases, and in the application of their products to the manufacture of alum.

2178. H. Pirotte. Improvements in the construction of lathes for boring and turning.

2190. W. H. Miller and H. E. Skinner. Improvements in rotary engines and pumps.

2191. C. Nightingale. Improvements in and applicable to machines for tearing or reducing rags and other fabrics.

2224. J. Dauglish. Improvements in the preparation of dough.

2235. F. J. Blanc. An improved tire for the wheels of railway carriages, engines, and tenders.

2254. A. V. Newton. A mode of varying the length and reversing the direction of the throw of eccentrics applicable to the reversing gear of locomotives, and expansion gear of other steam engines, and to other purposes. A communication.

2372. N. Fisher. Improvements in machinery combining operations in preparing land for agricultural purposes.

2380. T. Waterhouse. Certain improvements in machinery or apparatus for applying steam and atmospheric air to actuating and governing forge and other hammers.

2414. W. Smith. A novel machine or apparatus for engraving the metallic surfaces of printing rollers or cylinders. A communication.

2576. W. MacNaught and W. MacNaught. Certain improvements in steam engines.

2660. R. A. Brooman. Improvements in forming the joints of pipes for conveying water, gas, and other fluids. A communication.

2669. R. A. Brooman. Improvements in producing figured fabrics, in which the design is applied by printing. A communication.

2821. H. Baines. Certain improvements in machinery or apparatus for the prevention of accidents, applicable to hoisting and other lifting machines.

2825. W. Wilson and J. J. J. Field. Improvements in casting or moulding liquified and other substances.

2843. H. C. Bartlett. Improvements in the manufacture of paper.

2852. E. Coleman. An improvement in lathes for turning bolts, screws, and other small articles in metal.

2876. T. Richardson. An improvement in treating manganese ores.

2878. W. Gossage. Improvements in the manufacture of certain kinds of soap.

2882. G. T. Bousfield. Improvements in firearms, and in detonating compounds to be used therewith. A communication.

2890. E. Alcan. An apparatus to be applied to looms for producing figured fabrics of all kinds. A communication.

2898. C. W. Williams. Improvements in steam engine boilers.

2901. H. D. Pochin and J. Woolley. Improvements in the manufacture of gum or dextrine from amylaceous substances.

2908. D. Melvin. Improvements in machinery or apparatus for manufacturing heddles or healds for weaving.

2930. W. McFarlane. Improvements in moulding or manufacturing cast iron pipes and other generally similar hollow articles.

2945. A. and J. Martin. Improvements in cleaning, and in preventing the formation of deposits and incrustations in steam boilers.

2971. H. Deacon. Improvements in apparatus employed in the manufacture or production of caustic soda from liquors obtained in the manufacture of alkali, and applicable also to the manufacture or production of soap.

2983. F. G. Spray. Improvements in the manufacture of gunpowder.

3023. F. O. Ward. Improvements in manufacturing manure and obtaining accessory products. Partly a communication.

Opposition can be entered to the granting of a Patent to any of the parties in the above List, who have given notice of their intention to proceed, within twenty-one days from the date of the Gazette, in which the notice appears, by leaving at the Commissioners' office particulars in writing of the objection to the application.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2593. Edward Manière.
2602. William James Harvey.
2604. William Grindley Craig.
2605. Isaac Dodds.
2610. Christian Henry Richard Ebert and Lippman Jacob Levisohn.
2630. James Redgate, James Thornton, and Edwin Ellis.
2632. Llewellyn William Evans and James McBryde.
2643. Luke Turner.
2671. William Potter Dreaper.
2686. Richard Whytock and Thomas Preston.
2692. William Bertram.
2697. Jabez Smith.

LIST OF SEALED PATENTS.

Sealed December 11, 1857.

1641. Josiah Latimer Clark.
1649. George Davies.
1657. George Lister.
1702. Thomas Lowell Ralph and Thomas Lowell Ralph, jun.
1707. George Washington Charlwood.
1710. Stanislas Tranquille Modeste Sorel.
1719. William Edward Newton.
1761. Robert Mallet.
1840. Augustus Philibert Malard.
1857. Emanuel Ruegg.
2281. Joseph Gilbert.
2556. John Talbot Pitman.

Sealed December 15, 1857.

1456. Edwin Travis and Joseph Louis Casartelli.
1668. Charles Vero and James Everitt.
1675. William Young.
1678. William Smith.
1687. William Barnard de Blaquière.
1688. Richard Goulding.
1689. Philipp Kurten.
1708. Horace Hollister Day.
1712. Simon Pincoffs.
1722. William Wright.
1736. James Gascoigne Lynde.
1738. George W. La Baw.
1740. William Edward Newton.
1752. Daniel Evans.
1764. George Ireland.

1788. James Lamb Hancock.
1842. Thomas Moy.
1960. Thomas Ashton.
2242. Francis Preston.
2294. Thomas Gray and George Joseph Gladstone.
2344. William Geach.
2480. James Jackson.
2488. Thomas Crick and John Throne Crick.
2558. Jonathan Parker.
2614. Charles Coffey Alger.

The above Patents all bear date as of the day on which Provisional Protection was granted for the several inventions mentioned above.

NOTICES TO CORRESPONDENTS.

Enquirer.—Your last letter seems to indicate so great an indisposition to be satisfied, or even to believe what is stated, that unless you send your name, as a guarantee that your questions are put in good faith and for a useful purpose, we cannot give insertion to them.

J. A. D.—Your suggestion respecting the cooling of castings is not new. Your letter on the earth's rotation, plumb line, &c., is not sufficiently sound to be inserted. There is nothing novel in obtaining a vacuum by running mercury from a vessel. The discussion on the "atomic arrangement of fluids" cannot be prolonged. If you particularly wish to have your reply inserted, we will, however, give all that we think important of it.

J. P. Drake and W. Green.—Your papers have been received, but we have no space for them at present.

Articles and Correspondence designed for insertion in the ensuing Numbers of the *Mechanics' Magazine* must reach the Office by the Tuesday of each week, at the latest. It is highly desirable that they should be forwarded earlier, if possible.

CONTENTS OF THIS NUMBER.

LONDON: Edited, Printed, and Published by Richard Archibald Brooman, of No. 166, Fleet-street, in the City of London.—Sold by A. and W. Galignani, Rue Vivienne, Paris; Hodges and Smith, Dublin; W. C. Campbell and Co., Hamburgh.

Mechanics' Magazine.

No. 1794.] SATURDAY, DECEMBER 26, 1857. [PRICE 3D.

Edited by R. A. Brooman and E. J. Reed, 166, Fleet-street, London.

ROWAN'S PATENT STEAM BOILERS.

Fig. 2.

Fig. 1.

Fig. 3.

ROWAN'S PATENT STEAM BOILERS.

Mr. W. Rowan, of the enterprising firm of J. Rowan and Sons, engineers and boiler-makers, of Belfast, has patented the following simple improvement:—In order to economise the heat from the burning fuel, he constructs the flues of steam boilers in any of the modes now in common use, but instead of leading the flues directly away to the chimney, he carries them over the top of the boiler, and in these flues arranges the pipes which convey the steam from the boiler to the steam engine or other apparatus in as long and winding directions as may be, so as to obtain the greatest possible amount of heating surface in these pipes, and thus impart to the steam conveyed thereby an extra amount of heat, which would otherwise escape without producing any useful effect, and the steam is thus superheated. By this arrangement he prevents loss of heat by radiation from the top of the boiler itself, which is enclosed in flues containing gases which are of a higher temperature than the surface of the boiler. One of the most effective methods of carrying the invention into effect is shown in the accompanying engravings. Fig. 1 is a longitudinal section of a steam boiler. Fig. 2 is a transverse section of the same, and fig. 3 is a plan, partly in section, the covering of the top flues being represented as removed in order to show the arrangement of the flues and steam pipes. In each of these figures the same letters of reference apply to the same parts. A is the boiler, B B are the internal furnaces and flues, and C C the external side flues. D is the bottom flue leading to the chimney, and which in ordinary boiler furnaces would follow the side flues, C C. E is an arch built over the boiler, and at such a distance from it as to leave adequate flue space above the boiler. F is the steam dome on the boiler, from which proceed the steam pipes, G G′ G″, terminating with the shut-off valve, H. From this point the steam is conveyed away in any direction required. The steam pipes, G G″, are carried by brackets fixed to the boiler. To the brackets are attached plates extending nearly as far as the length of the pipes, G G″, and forming with them partitions or divisions between the upper side flues, I I, and the central flues, J J. K K are passages forming the communications between the side flues, C C, and the upper side flues, I I; and L L are passages connecting the central flues, J J, with the bottom flue, D, whence the products of combustion proceed to the chimney after taking a course through the various flues as indicated by the arrows.

PROGRESS OF CIVIL ENGINEERING.

At the Annual General Meeting of the Institution of Civil Engineers, Dec. 15, 1857, R. Stephenson, Esq., M.P., president, in the chair, the report of the council for the past session, was read which stated, that the Indian mutiny had, for the moment, interrupted the progress of public works in that country, whilst the monetary crisis throughout Europe and in the United States had arrested nearly all professional occupation. Under these circumstances there were, comparatively, but few events to notice. Allusion was, however, made to several undertakings which had occupied the attention of civil engineers during the preceding twelve months, including the unfortunate failure in the attempt to lay the submarine electric telegraph cable between this country and the United States; and the hope was expressed that this daring enterprise would be completed next year. The following statements are taken from the official abstract furnished to the press.

The electric cables between Cagliari and Malta, and between Malta and Corfu, had been successfully submerged, in spite of the great depths of the channels. Mention was also made of the project, brought forward by Sir Macdonald Stephenson, Assoc. Inst. C.E., and Mr. J. C. Marshman, M.P., under a firman granted to Mr. Lionel Gisborne (Assoc. Inst. C.E.), of a submarine telegraph to India by way of, and along the Red Sea. It was intended to take the messages at Alexandria, convey them by the wires of the Suez railway, a privilege conceded by the viceroy, to lay down a series of submarine cables from Suez to Aden, and thence to Ras-el-had, on the Persian Gulf; so arranging the intermediate stations, that the unbroken length of each cable should not exceed 500 miles. Thence to Kurrachee, being only 400 miles across the ocean, where a junction would be made with the existing Indian telegraphs. The entire length of cable between Suez and Kurrachee would not be more than 4,000 miles, and the cost, it was believed, would not exceed 700,000*l*.

Another great work was the *Leviathan* steam-ship, constructed by Mr. Scott Russell (M. Inst. C.E.), under the direction of Mr. Brunel, V.P., which, being now within reach of the water, there was good reason to believe would be safely floated off the "ways" during the next high tides.*

Among the works in an advanced state,

* This was, of course, written before the latest failure at Millwall.—Eds. M. M.

the bridge erecting by Mr. Brunel, V.P., on the Cornwall Railway, for carrying the line across the river Tamar, at Saltash, near Plymouth, was prominently alluded to.

The new landing stage at Liverpool, which had been recently completed from the designs of Sir William Cubitt, at a cost of about 110,000*l*, was supported by 63 pontoons of a rectangular form, 49 of which were 80 feet long, and 10 feet wide; and two, at the extremities, 12 feet wide, and the same length; the remaining twelve were 96 feet long and 10 wide, so as to provide additional strength and floatation at the points where the four bridges, communicating with the quay were attached to the stage. These pontoons were crossed at right angles by five wrought-iron beams, or keelsons, each 1,000 feet long; and these again were covered with strong cross-beams 6 inches thick, and planked over with planks, forming a rectangular deck 1,000 feet in length, and 80 feet in width, slightly curved in its breadth, being higher in the centre than at the sides, throughout its whole length. This landing stage had been in use for about five months, and appeared to give general satisfaction.

A further important section of the Grand Trunk Railway of Canada, now constructing by Messrs. Peto, Brassey, and Betts, under the direction of Mr. Alexander Ross, had been opened for traffic; so that the total length of the main line was now nearly 850 miles, with several branches. The piers of the Victoria Tubular Bridge, which was to span the river St. Lawrence, were fast progressing; the two land abutments and fourteen of the piers having been completed, and one of the wrought-iron tubular girders was already in position. When completed, this bridge, which had been designed by Mr. R. Stephenson, M.P., president, would be nearly two miles in length, and would consist of twenty-five openings, spanned by tubes of wrought iron, like those of the Britannia-bridge.

In connection with this line of railway, an arrangement had been organised by Mr. S. P. Bidder, the general manager, by which passengers of all classes could be booked through from all the principal emigration ports of this country, or the continent, to their several destinations, in any part of Canada or the United States. This facility had proved to be a great boon to emigrants.

The Rivington Waterworks of the Liverpool Corporation, constructed by Mr. Hawksley, M. Inst. C.E., were brought into operation in the early part of the present year. The works consisted of several impounding reservoirs, two of which had embankments of nearly 100 feet high, and two others with embankments of about 50 feet high. These reservoirs held about three thousand two hundred million gallons, and were intended to deliver about fourteen million gallons per day to the inhabitants of Liverpool, and nine million gallons per day to the mill-owners and others whose interests were affected by the works. After being stored, the water was passed through a cast-iron main-pipe of 44 inches diameter, and 23 miles in length.

The supply of water for Glasgow was now being furnished from Loch Katrine by very extensive works, designed and executed under the direction of Mr. Bateman (M. Inst. C.E.), who, it was hoped, would give to the institution an account of this large undertaking.

The Bombay Waterworks, under Mr. Conybeare, M. Inst. C.E., were rapidly approaching completion. They were chiefly remarkable for the large population, seven hundred thousand persons, supplied from a single establishment; the reservoir, or artificial lake, at Vehar, fourteen miles distant, nearly 1,400 acres area, with a maximum depth of 80 feet. It was formed by damming up three outlets of the central basin of the island of Salsette; the rapidity of execution, and the economy of construction of the works, were also deserving of attention. The works were on the gravitating principle, and the water was to be conveyed to Bombay by a double line of conduit pipes of cast iron.

Very extensive works were now in progress, under the direction of Mr. G. P. Bidder, V.P., and Mr. G. R. Stephenson, M. Inst. C.E., for the Netherlands Land Enclosure Company, with the object of reclaiming a tract of land which had been inundated in the seventeenth century, by the overflowing of the Eastern Scheldt, near Bergen-op-Zoom. The Act of Concession, granted by the Government, conveyed to the Company a freehold lease for ninety-nine years, stipulating in return for the permission to reclaim 35,000 acres, that there should be constructed a barrage, or bank, across the Eastern Scheldt, so as to close up the passage on the east side of the island of South Bevelands; a ship canal 18 feet deep across the island, with locks, 50 feet wide, swing bridges, harbours, piers, &c., so as to compensate for the closing of a portion of the Scheldt. The barrage would be about 2½ miles in length, and eventually the proposed railway, connecting Dusseldorf with Flushing, would run upon it. In 1856 the first polder of an area of 1,100 acres was successfully enclosed; during the present year another polder containing 1,700 acres had been reclaimed, and in future annual enclosures would be effected. The land so reclaimed was of a most

fertile quality, and large crops of colza had already been produced on the first polder.

The principal papers read during the session were then noticed, and it was remarked that, as usual, the discussions occupied a longer time than the reading of the papers, and would be found to add greatly to the interest of the minutes of proceedings.

The members were strongly urged to continue to present copies of scientific and professional works for the library, without which its utility for reference and consultation could not be maintained.

The statement of the receipts and expenditure showed that there was a balance of upwards of £700 in the hands of the treasurer, printers' and lithographers' accounts for all the minutes issued up to this date having been discharged, and there being now no liabilities outstanding.

It was stated that, during the vacation, it had been determined to recognise the services of Mr. Charles Manby (as the secretary during eighteen years) to the institution, by the presentation of a testimonial. The proposition was eagerly received, and such an amount was promptly subscribed as enabled the committee to devote a portion to the purchase of a clock and a pair of candelabra, which, with a cheque for £2,000, were presented to Mr. Manby by the president, in the presence of the members, in the theatre of the institution. In returning thanks for this mark of friendship and good will, Mr. Manby requested permission to devote some portion of the amount to the establishment of an annual premium, with which he begged that his name might be associated. He had accordingly transferred to the institution the sum of £200, in five per cent. debentures, the interest of which (£10 per annum) it was proposed to award to the authors of papers read at the meeting, to be denominated the "Manby Premium."

It was announced, also, that the report of the committee conducting this matter would, with the names of the contributors, be published in the volume of the minutes of proceedings for the past session.

Mr. G. Ritherdon, cashier and collector, was recommended for a pension of £50 per annum, in recognition of his long services to the institution.

The report concluded by impressing upon the members redoubled zeal on behalf of an institution which had exercised and must ever possess such beneficial influence on the profession of civil engineering. After the reading of the report, Telford medals were presented to Messrs. D. K. Clark, R. Hunt, F.R.S., G. Rennie, F.R.S., and W. B. Adams; and council premiums of books to F. R. Window, G. B. Bruce, A. S. Lukin, C. E. Conder, W. Bell, F. R. Conder, and T. Dunn.

The thanks of the institution were unanimously voted to the president, the vice-presidents and other members and associates of council. A special vote of thanks was accorded to Mr. C. Manby, secretary, for the manner in which he had performed the duties of his office, his constant attention to the individual wishes of the members, and for his liberal donation to form a fund for an annual premium, which it was resolved should be permanently marked by the establishment of a "Manby Premium."

The following gentlemen were elected to fill the several offices on the council for the ensuing year:—Joseph Locke, M.P., president; G. P. Bidder, I. K. Brunel, J. Hawkshaw, and J. R. McClean, vice-presidents; W. G. Armstrong, J. Cubitt, J. E. Errington, J. Fowler, C. H. Gregory, T. E. Harrison, T. Hawksley, G. W. Hemans, J. S. Russell, and J. Whitworth, members; and S. Wood and M. D. Wyatt, associates.

The meeting was then adjourned until Tuesday, January 12th, 1858, when it was announced, that the monthly ballot for members would take place, and the following paper would be read, "On Self-acting Tools employed in the Manufacture of Engines, and in Shearing, Punching, and Riveting Boiler Plates," by Mr. T. S. Sawyer.

WRITING, PRINTING, AND COPYING INKS.

At the Society of Arts, on the 16th Dec., Mr. Underwood, of the firm of Underwood and Burt, Fleet-street, London, read a very interesting paper on the history and chemistry of writing, printing, and copying inks, including a description of a new plan of taking manifold copies of written and printed documents, maps, charts, plans, and drawings. After comprehensively reviewing the nature of ancient inks, and pointing out the fact that the permanence of records depends greatly upon the quality of the paper or parchment on which they are deposited, the speaker proceeded to describe his own methods of proceeding, which have been recently patented.

He prefers preparing the paper, after it is finished and sized, by soaking each sheet in a solution of the neutral chromate of potash, and then slightly glazing it by rolling, and writing on paper so prepared with an ink made with galls, iron, and logwood. In the manufacture of this and all ink, the quality of the water used is of great importance. To obtain the best and purest ink, nothing but distilled water should be used. The next point of importance is the

purchase of the galls, which should be the rough blue Aleppo, as they contain more gallic and tannic acids than the inferior sorts, and these should be bruised fine, though not powdered. As inferior galls are often dyed blue by dishonest traders, the ink manufacturer should make himself thoroughly acquainted with the different sorts. He treats the galls with distilled water for a few hours, till they are quite soft, and then lets the decoction stand for three or four days, when the clear liquid is strained off, and to it is added some of the best gum Senegal. When this is dissolved, he throws into it a quantity of clean iron filings, or several coils of fine iron wire, and agitates several times a day, till the liquid is turned of a deep black. He then draws it off from its sediment, and dissolves in it some pure extract of logwood. In the course of the operation of the liquid upon the iron, considerable effervescence takes place, which is caused by the decomposition of the water, the hydrogen escaping, and the oxygen forming with the iron an oxide, which the gallic acid in the solution dissolves. In using the ink on the prepared paper, the logwood, being in the state of extract, combines with the neutral chromate of potash, and throws down into the very pores of the paper a black precipitate, which, when dry, is perfectly proof against most chemical re-agents. Thus he obtains an ink which, while it is jet black at the time of use, is sufficiently limpid to flow freely in the pen, leaves no surface on the writing, does not become mouldy for a very long time, and is, when used on the prepared paper, literally indelible. "Although I cannot, of course, speak positively of the effects of time," said Mr. Underwood, "yet I think, seeing that the application of chlorine makes no change on it, and that the black precipitate is formed in the texture of the paper, away from all action of the air, we may conclude that time will have as little effect as the chemical re-agents."

The ink made as above suggested, if used on unprepared paper, which dries quickly and leaves no surface on the writing, may at any time after be copied on thin paper prepared with the neutral chromate of potash, and these duplicates as well as the original, when once dry, are as proof against chemical re-agents as if the ink had been used on the prepared writing paper. Instead of keeping two inks in the office, Mr. Underwood proposes to have only one, and to write all letters on unprepared paper, taking a copy of them; while all deeds and other paper documents should be written on the prepared paper, which is also made up into account books, and thus papers, books, and letters, are all alike proof against the probable effects of time, or any endeavour wilfully to tamper with them.

"The attention of myself and partner," continued Mr. Underwood, "was called (last March) by the Executive Government of this country to a requirement for the more rapid and effectual transaction of their business, and which we afterwards found to exist as extensively in the commercial world. Your Society being aware of the want, had, unknown to us, offered a premium, some two or three years back, for the discovery of some expedient to supply this deficiency, requesting the invention of some plan for rapidly taking many copies of written documents. At first, I looked upon the number of copies required by the Government as an insurmountable difficulty; but being much urged by them to make experiments, and remembering that we had overcome the difficulties of making printing inks copyable, to which I shall shortly refer, I resolved to try what could be done. The idea occurred to me that, by preparing the ink I wrote with, and the paper, with different chemicals having a strong affinity for each other, and which should throw down coloured precipitates, or by chemical reaction change colour wherever they came in contact, I might instead of one take many copies of a document at the same time, and after I had tried many chemicals I found my theory to be correct. The process which gave me most copies was by preparing the thin paper with the neutral chromate of potash, and writing with a strong solution of extract of logwood. Many experiments were required to discover the right strength of the solution of neutral chromate of potash with which the paper is to be prepared, because if I used much of it I could only take one or two copies, as the whole of the extract of logwood would be acted upon by the quantity of the chemical salt in the first sheet or two; therefore to get many copies it is necessary so to reduce the quantity, that, while there is enough to have a chemical affinity for the extract, and to change colour wherever it is attracted, it shall not be enough to neutralise the extract until the desired number of copies are taken; and therefore, instead of having paper prepared with the different quantities of the salt, according to the number of copies required, which would have tended to much confusion in all offices of business, we thought it best to have one standard for the paper; and though we would only keep one ink for letter writing and general purposes, yet we make different qualities of this manifold copying fluid. We have three of these; our No. 1 is the ink formerly noticed as useful for both copying and book purposes, and from which two copies may be taken; our

No. 2 has no galls or iron, but is a solution of pure extract of logwood so carefully prepared that exposure to the air in its liquid state shall not have any effect on it, although otherwise it would change in a few months, and from which six or eight copies may be taken at the same time. Another we call No. 3, which is the same, only containing more extract of logwood, and which gives twenty to thirty copies, even more if the writing is allowed thoroughly to dry before attempting to copy. We have also produced an Indian ink on the same principle, which, when used in the preparation of architectural plans, maps, &c., will give one or more clear copies of even the finest lines. The only point to be observed in the taking of such copies is that, as they are done to a scale, they must be kept pressed in close contact with the original till they are perfectly dry, because if not they will shrink in drying, and the scale be spoilt. While speaking of copying such plans, I may state what I believe has never before appeared in print, or been made public,: that the ingenious Watt, who invented the plan of copying letters, turned his attention to this point also, and, instead of the ordinary China or Indian ink, used lamp-black rubbed up with the finest and oldest sherry wine, and from plans so made took off a copy on damp paper. From this, which, of course, was reversed, he could take many copies, by letting a boy overrun each of the lines with a mixture of lamp-black and sherry, and after each time of its being so overrun he could take four or six copies on damp paper. But though the process is adopted by one or two engineering houses in the present day, it is very troublesome, and unless very many copies are needed, it has always been found easier to take tracings. But in all architects' and engineers' offices we believe that our process will be adopted and save an immense deal of time and labour."

Relative to printing inks, Mr. Underwood stated that we are greatly indebted for late improvements to the chemical knowledge brought to bear upon this branch of manufacture by the Messrs. Flemmings, of Leith, who carried off the prize medals for printing inks at both the New York and Paris Exhibitions, and acknowledged their kindness in fully explaining to him the most important points in the manufacture of really good printing ink.

The necessary qualifications are,

1st. It must distribute freely and easily, and work sharp and clean.

2nd. It must not have too great tenacity for the type, but have a much greater affinity for the paper, and so come off freely upon it.

3rd. It must dry almost immediately on the paper, but not dry at all on the type or rollers.

4th. It should be literally proof against the effects of time and chemical re-agents, and never change its colour.

To attain these objects, great experience and care are required in the purchase of the raw materials. Of one of these, linseed, there are many varieties, the Baltic, Black Sea, and East Indian, each yielding oil very materially different. The ink-maker having tried his seed previous to purchase, to see that it yields the best oil, must be careful in its crushing, and should only use the oil which comes from the first crushing. The oil is now clarified from the fatty matters, and the pure oil is then boiled with great care, and when in a proper state, the best pale yellow soap is added, to give it consistency. During the boiling, the dryers are added with great care. The boiled oil, with these additions, becomes a varnish. In the making of ink for some of the finer descriptions of book-work, palm oil and cocoa-nut oil are valuable additions. The next point is the manufacture of the blacks, which is a far more scientific operation than one would at first imagine. The finest naphtha only, very carefully rectified, should be used, and on burning it the application of oxygen must be regulated to the combustion, otherwise the sudden expansion of the gases with limited vent would cause a serious explosion, and care is requisite, not only for the safety but for the quality of the blacks, as, if you have not the right quantity of oxygen, the blacks will have more or less of a brown tinge and be very inferior in quality. The empyreumatic oil must now be burnt off; but the secret of making good blacks, which only practice and chemical knowledge will give, is to have as little of this oil present as possible, so that the more experienced manufacturers have far less to get rid of than others. The black, if of a sufficiently deep and rich colour, is now to be ground up carefully with the varnish, which completes the manufacture of the ink, and, thus made, it can never turn of a brown colour. Ink made upon this plan, while doubtless the best for book purposes, does not answer for many of the requirements of commerce, and some of the railway companies and large mercantile firms have long been anxious to obtain an ink capable of having copies taken from it by the ordinary copying press. This difficulty Messrs. Underwood and Burt have got over by using a deep-coloured varnish, which will freely dissolve in water, instead of the oily one just described, with which they grind their black, or, if they desire more than one duplicate, using a chemical in it such as logwood, and taking their copies on the

prepared copying paper, regulating the proportions of logwood to the number of copies required. These copies, with the original, being based on the same principles as the plan of taking duplicates of written documents, are, like them, proof against chemical re-agents, or the probable effects of time.

Mr. Underwood had proposed to explain how, by varying the chemicals used, the same principles may be carried out to take manifold coloured copies of drawings, paintings, &c., but time prevented him.

NOTÆ MATHEMATICÆ.

BY T. T. WILKINSON, F.R.A.S., &C.

(*Continued from* Vol. lxiv. p. 293).

No. XI.

During my examination of the English mathematical periodicals, in order to give an account of their contents to the readers of this Journal, I was naturally led to notice the anonymous signatures which some correspondents were in the habit of using when passing circumstances rendered it desirable for them to adopt some disguise. In many instances there was no difficulty in assigning to each the real name of the writer; in others the authors perfectly succeeded in eluding the shrewdest guesses of more experienced men than myself. This, in itself, is a matter of small moment, and it could only gratify a few of the most curious were the veil drawn aside. However, since it may sometimes be desirable to know the real name of the author whose papers we may be examining, I have ventured to classify my list and offer them to the notice of the readers of the *Mechanics' Magazine.* One or two of the explanatory notes have reference to former papers, and may serve to throw light upon some allusions which would otherwise perhaps be unintelligible.

"Nichol Dixon"=Emerson, as is stated by Dr. Hutton in his *Mathematical Dictionary.* He chose this signature, because it was the name of the travelling tinker of the district, and it had also been applied to himself as the local clock cleaner and harpsichord tuner of the same locality.

"Malachy Hitchins" was long supposed to be an assumed name; but it appears this was a mistake, for he was a Fellow of Exeter College, Oxford. He proposed, in a letter to Nourse, dated "8th April, 1765," to publish by subscription a work under the title of "Syntagma Analyseos," or "A New Introduction to Mathematics;" and added the inducement, "As I often write to the *diaries, magazines,* &c., under various fictitious appellations, I may thereby promote its sale by recommending or quoting it." The work, however, was never published.

"Upnorensis," and various others= Robert Heath, Captain of Invalids, and some time Editor of the *Ladies' Diary.* In a letter to Nourse, dated "20th June, 1775," he asks: "Have you any new things in mathematics, and what? Mr. Emerson would be glad to know whether anything on the Structure and Strength of Elliptic and Circular Arches? He is now upon that subject. You see the arches of Blackfriars'-bridge are elliptical; those of Westminster-bridge nearly circular; which of the two bridges will last longest is the question." "The Invalids," says the late Professor Davies, "were independent companies, not formed into battalions, and were composed of soldiers from all regiments who were deemed unfit for foreign service, but yet who were fully equal to garrison duty. The captain was answerable to Government only, and was perfectly independent of local military authority. They were disbanded in 1803, and shortly afterwards the veteran battalions were formed in place of them; the main difference appearing to be that the latter were thus brought under the ordinary routine and practice of military authority and discipline. The Invalids had long been considered a nuisance as independent companies. The enrolment of the able-bodied pensioners in our own day seems to be some slight improvement on the system, and the formation of the Dockyard Battalions an imitation of the same scheme."

Most of the Greek names adopted in the old series of the "Mathematician" and "Turner's Exercises" belong to Thomas Simpson, Professor of Mathematics at the Royal Military Academy, Woolwich. He probably adopted these in order to avoid the attacks of Emerson and Heath. The latter hated Simpson, because the Stationers' Company preferred him as Editor of the *Ladies' Diary*, and Mr. Marrat, of Liverpool, assigned the following reason for the commencement of the feud between Simpson and the former. "Dr. Olinthus Gregory told me that Simpson, Holliday, and Hamilton Moore, met together at a public-house in London, when Holliday asked Simpson what he thought of Emerson? Simpson replied, 'Oh! he is an industrious plodding fellow, but a man of no genius.' This having been told to Emerson, so moved his bile that they were never friendly after." The readers of our mathematical periodicals ought to distinguish between Thomas Simpson, the Professor, and Thomas Simpson, the agent for the Stationers' Company.

Both were living and held office at the same time. I often find Dr. Simson, of Glasgow, confounded with Professor Simpson, of Woolwich, and that, too, by some who ought to know better.

"Samuel Thornoby," = Thomas Leybourn, the signature being an anagram of his name. In number 4 of the *Mathematical Repository* (O. S) "the Editor (Mr. Leybourn) begs leave to inform Mr. S. Thornoby, that he believes Mr. Professor Playfair's edition of the 'Elements of Euclid' the best for a learner." This was probably in return for the Professor's having given his consent for the republication of his "Essay on the Origin of Porisms" in the first number of the *Mathematical Tracts.* The copperplates of the diagrams, I find, are the same in both the *Tracts* and the *Edin. Transactions.* In some other parts of the *Repository* I find the Editor *awarding the prize to himself* under the disguise of this assumed name!

"Mr. Zeptremog" in the *Repository,*= Benjamin Gompertz, the signature being his name reversed. His late Essay on Porisms is a valuable contribution to this difficult subject."

"Amicus," in the *Ladies' Diary,*=the Rev. Charles Wildbore; in the *Mathematical Companion,*=Professor Lowry; in the *Leeds Correspondent,*=John Whitley. Mr. Whitley also wrote under the signatures "Geometricus," "Philo-Veritas," "Mr. Welhity," "Plus-Minus," "N. Y.," and several others.

"James North,"=Dr. Hutton; "Terricola,"=Dr. Maskelyne; "Jack Chance, Whackum, Caput Mortuum, Curiosus, and Numericus,"=Professor Dalby. "Astronomicus."=Sir James Ivory; "Scoticus, and G. V.," belong to Professor Wallace, of Edinburgh, who is also=" Edinensis." "A Lady,"=" Mrs. Somerville." "A. B. L.," =Miss Lousada, a Jewish lady, to whom Mr. Gompertz dedicated his "Tract on Imaginary Quantities and Porisms." She left in MS. a translation of Diophantus, with notes, but it has never been published, although Professor De Morgan is said to have been consulted on the subject. "M. A. Harrison, Mr. Hill, and Miss Sally Hill,"=John Lowry,=" N. Y." in the *Repository.* "Mr. Pound,"=Mark Noble; "Omicron of Penrith,"=Thomas Slee; "Investigator,"=Dr. Gregory; "Proteus," in the *Companion,*=Mr. Lowry, in the *Diaries,*=Professor Davies. "Cluthensis," =Thomas Galloway; "Roger Vayheeg," =Dr. Harvey; "Tonthu,"=Dr. Hutton; "Anti-mendax,"=" J. H."=the Rev. John Hellins, D.D. "Vulcan," "A. C. Smith," and some others=N. J. Andrew, of Penzance. He was a working smith, and chose the signatures in allusion to his trade. "Exoniensis," and "J. J."=James Jerwood, Esq., M.A., of Exeter.

"A. H.," in the "*Mechanics' Magazine,* is understood to=the Rev. Alfred William Hobson, of St. John's College, Cambridge, now principal in the Mining School, Truro; "R. N."=" Mr. Paterson"=Peter Mason; "Palaba"=the Rev. Lawrence Palk Baker, B.D., formerly Lecturer on Algebra at St. John's College, Cambridge; "Jesuiticus" =the late G. W. Hearn, of Sandhurst Military College; "Petrarch" = the Rev. Hamnet Holditch, Senior Fellow of Caius College, Cambridge. He proposed the Prize Question in the present year's *Diary,* and *generalized* the enunciation for any closed curve in the *Quarterly Journal of Mathematics* for January, 1857, where a solution may be seen. "Geometricus," "Theon," and several others in different periodicals=the late Henry Buckley, of Delph. He was an excellent geometer, and a worthy pupil of Butterworth. "Demosthenè,"=Ralph Clough, of Ashton-under-Lyne; "Pen-and-Ink," "Shadow," "Centurion," "Miss L. L.," "Dunelmensis Bathonensis," "Zephyr," "Rev. Peter Twaddleton," "Figaro," "Sidrophel," "Diedrich Knickerbocker," "S. S. S.," "Brown Rappee," and several others=the late Professor Davies; "C. C.," "Nicol," and one or two others=the late Colin Campbell, Esq., of Liverpool. He has left behind him some very meritorious geometrical investigations, and a translation of the Appendix to Dr. Simson's "Treatise on Conic Sections," which at one time were intended to be added to a second edition of his elegant "Lucubrations in Mathematics." Both Mr. Gaskin and Mr. Potts reported favourably of the intended additions and publication; but the unexpected death of the Rev. Colin Campbell put a stop to the project. It is not, perhaps, too much to hope that the grandson of this able geometer will carry out the intentions of his father, and thus do honour to the memory of his ancestor.

(*To be continued.*)

INSTITUTION OF ENGINEERS IN SCOTLAND.—The address of Professor W. J. Macquorn Rankine, LL.D., delivered at the opening of the above institution, an abstract of which appeared in our Magazine for Nov. 7, has since been published in a complete form by Mr. Mackenzie, the publisher, of Howard-street, Glasgow. It is a very interesting and instructive paper, and a perusal of it would well repay the trouble of obtaining it.

ON THE PROTECTION OF WOOD FROM FIRE.

(*Continued from p.* 582)

A trial was made of the firmness of the coating, by applying heavy blows to the surface of the wood. The covering was only disturbed in one or two places, where the lime had been laid on rather too thickly.

Upon the results of these experiments being reported, an order was issued by Lord Panmure to have the proposed process for the protection of wood from fire practically tested at some of the camps or stations.

It was ultimately arranged that a proper trial of the process should be instituted at Chatham, under the direction of Colonel Sandham, R. E.

The nature of the experiments performed at Chatham, and the results obtained, are detailed in an official report, from which the following extracts are taken:

EXTRACTS FROM A REPORT OF EXPERIMENTS AT CHATHAM, FROM COLONEL SANDHAM, R.E., AND F. A. ABEL, ESQ., TO THE INSPECTOR-GENERAL OF FORTIFICATIONS.

Sir,—We have the honour to inform you that some experiments with silicate of soda applied in conjunction with lime-wash, as a means of protecting wood from fire, and of retarding its combustibility, have been made at Chatham, on a sufficient scale to determine practically the value of this agent, if applied as a preservative to camp-huts.

* * * *

We consider the experiments to have afforded conclusive proof, on a practical scale, of the considerable power possessed by silicate of soda, applied simply as a coating, in conjunction with lime, of retarding the inflammability of wood.

It is of course impossible, even by the thorough impregnation of wood with various substances, to deprive it of the property of burning. The only results to be attained by the use of a protective material are—

1st. To shield the substance of the wood itself in a great degree from the effects of neighbouring fire, or of the vapours which will issue from over-heated wood, and burn on its surface, and—

2nd. To deprive the wood, to a considerable extent, of the power of carrying the fire along, thus rendering necessary the *continued application* of heat or fire from another source (such as an over-heated stove or unprotected portions of wood) in order to effect its thorough ignition.

An examination of the experiments shows that these results are obtained by the application of the silicate of soda to the wood.

This substance may be obtained in any quantity at a very reasonable rate, and the method of applying it is so simple, that the wood may be properly prepared with it by ordinary workmen.

It appears to us important that, if its application to new camp huts should be determined upon, the wood to be employed in their structure should be completely coated with the preparation before the erection of the buildings, in order to give the latter a fair chance of resisting the action of fire reaching the wood from any quarter.

But even in buildings already erected it is of importance that those portions which are in any way liable to possible exposure to heat or fire (that is, the portions in the vicinity of stoves), should receive the very considerable protection which would be afforded by the application of the silicate coating, any covering of paint or paper having first been removed.

We beg to give it as our opinion that the efficiency of the protective agent in question has been sufficiently tested to obviate the necessity of further trials upon a large scale; and submit, in conclusion, that, while the extensive employment of light wooden buildings for huts and temporary workshops renders the application of some protective material to the *interior* of these, at any rate, a matter of great importance, it is of equal consequence that such an agent, if adopted for use in the service, should be easy of application and inexpensive, and that its employment should be as completely under the control of Government as that of any ordinary coating material.

H. Sandham.
F. A. Abel.

The above report was accompanied by a communication relating to the cost of the application of the silicate coating, in which it was stated that, provided the silicate of soda employed has been prepared with especial reference to this application (that is, so as to be readily and completely mixable with water), one pound of the material is sufficient to prepare a surface of wood of ten square feet; while the wholesale price of the silicate, in the form of a syrup of a certain degree of concentration, is 20 lbs. per ton; so that the cost of the silicate required to prepare the wood is at the rate of about twopence for a surface of ten square feet.

The following are the directions adopted for general guidance in preparing wood with the coating of silicate of soda and lime.

DIRECTIONS FOR COVERING TIMBER WITH A PROTECTIVE COATING OF THE SILICATE OF SODA AND LIME.

Materials employed.—The silicate of soda must be in the form of a thick syrup, of a

known degree of concentration, as manufactured by Messrs. Simpson and Co., Kennington-road, London.

The lime wash should be made by slaking some good fat lime, rubbing it down with water until perfectly smooth, and then diluting it to the consistency of thick cream.

Treatment of the wood.—The protective coating is produced by painting the wood firstly with a dilute solution of silicate of soda; secondly, with the lime wash; and lastly, with a somewhat stronger solution of the silicate.

The surface of the wood should be moderately smooth; and any covering of paper, paint, or other material, should be first removed entirely, by planing or scraping.

A solution of the silicate, in the proportion of one part by measure of the syrup to three parts by water, is prepared in a tub, pail, or earthen vessel, by simply stirring the measured proportion of the silicate with the water, until complete mixture is effected.

The wood is then washed over with this liquid, by means of an ordinary whitewash brush, the latter being passed two or three times over the surface, so that the wood may absorb as much of the solution as possible. When this first coating is nearly dry, the wood is painted with the lime wash in the usual manner.

A solution of the silicate, in the proportion of two parts by measure of the syrup to three parts of water, is then made; and a sufficient time having been allowed to elapse for the wood to become moderately dry, this liquid is applied upon the lime in the manner directed for the first coating. The preparation of the wood is then complete. If the lime coating has been applied rather too thickly, the surface of the wood may be found, when quite dry, after the third coating, to give off a little lime when rubbed with the hand. In that case it should be once more coated over with a solution of the silicate, of the strength prescribed for the second liquid.

MOTIVE POWER.— Mr. J. Bourne has patented an invention which consists in forcing air and fuel into a heated vessel, and in using the products of the combustion thus effected in the generation of power. The air may be forced into the combustion chamber either by a pump or fan. The fuel must be forced in, either continuously or at short intervals. The fuel preferred is coal in the state of fine dust, and this may be sucked in by the suction orifice of a fan, and be forced with the air by the action of the fan into the chamber.

THE LATE SIR GEORGE CAYLEY.

OUR old and valued correspondent, Sir G. Cayley, Bart., died on the 15th inst., at the advanced age of eighty-four years. The numerous and valuable papers contributed by him to this Magazine, from its origin, have rendered his name and genius well known to our readers. The *Times*, in noticing his decease, says:—"As a scientific man he held a very distinguished position. His inventive genius first displayed itself in the successful analysis of the mechanical properties of air under chemical and physical action. His papers on this subject were published in the philosophical journals of the day, and gave rise to a number of experiments, both in this country and abroad, on the navigation of balloons, which then took up much of the public attention. He pointed out the fallacy of any hopes of success in the absence of a given power within a given weight; and, being well acquainted with the steam engine, on which he had made many experiments with a view to the construction of the disc and rotatory engine, he showed that there was little chance of obtaining sufficient power from steam. These inquiries led to his invention of the air engine, a masterpiece of original conception, which proved the great advantage of using expanded air instead of steam, where weight was an important consideration—a discovery that the Americans are now endeavouring to apply, and one that engaged his attention up to the period of his death. Lately he made some discoveries in optics, which were followed by the construction of an instrument for testing the purity of water by the abstraction of light—an instrument which has been lately used with success in investigating the waters of the Thames. Another of his contributions to scientific knowledge was a remarkably ingenious arrangement for obtaining and applying electric power to machinery. He was one of the original promoters and chairman of the Polytechnic Institution. He also originated and carried out, nearly sixty years ago, an extensive system of arterial drainage, embracing 40,000 acres in the neighbourhood of his Yorkshire estates, on a principle previously unknown in this country. He was, we believe, between forty and fifty years since, one of the first, if not the very first, promoters of the drainage and improvements in husbandry which now so much distinguish Lincolnshire, where one of his estates was situated. He was also the first promoter and adopter of the cottage allotment system for the purpose of improving the condition of the poor on his property. As a politician he exercised an important influence as chairman of

the Whig Club at York. Through his instrumentality while in that position Mr. Wyvil was returned as an independent member for York, which had up to that period been a close borough in the hands of one or two noble houses. He also took an active part in favour of the Liberal candidate during the celebrated election of Wilberforce, Milton, and Lascelles, and, subsequently, in the election of Lord Brougham. Upon the passing of the Reform Bill he was himself returned to Parliament for Scarborough, but he was then at too advanced an age to assume a leading position in public life, and retired to philosophical pursuits after occupying his seat for a single Parliament. The late baronet was the father-in-law of Mr. E. S. Cayley, one of the members for the North Riding of Yorkshire, and he is succeeded in his title and estates by his son, Sir Digby Cayley."

DOULTON'S PATENT OPERCULAR, OR LIDDED PIPES.

The object of these improved drain pipes, which have been recently patented by Messrs. Doulton and Co., is to permit of examination and cleansing without disturbing any part of the invert of the drain, or lessening its capacity. Unlike other contrivances for this object, the entire length of pipe may be thrown open without any accompanying disadvantage.

The thickness and strength of the pipes are increased by two ribs running lengthways, through which a partial division is

effected in the process of manufacture, both internally and externally, leaving sufficient material to preserve strength and soundness. The pipes are fired in one piece, and accuracy of form is thus secured. By the insertion of a chisel at the ends, the upper pieces may, at any time, be detached without the slightest risk, and afterwards replaced, so as to form a perfect and accurately fitting cover; or the lids can be removed when the pipes are laid, and the drain tested as to its fall, and the accuracy of the joints before they are replaced. The improved pipes are illustrated in the accompanying engravings. Their advantages are thus set forth by the manufacturers:

"1. The pipes may be laid whole as ordinary socket pipes, and the covers need only be removed should necessity arise.

"2. On the removal of the lids the drain is laid open throughout its entire length, and may be cleaned without disturbing any part of the invert.

"3. The advantages of inspection are obtainable without any imperfect joints or other complication, which would allow either the escape of the liquid contents of the drain, or the entry of the surrounding soil.

"4. The capacity of the drain is not lessened when under examination, as is shown by the cross section.

"5. The introduction of junctions is facilitated.

"6. The upper part or cover being fired in one piece with the pipe, fits with a perfection and accuracy only possible by this peculiar mode of manufacture, and it cannot shift laterally.

"7. Perfect truth of form is secured, and increased strength obtained.

"8. Simplicity of construction, and consequent cheapness."

The pipes are made with sockets, or with butt joints and chairs.

THE LAUNCH OF THE "LEVIATHAN."

Tuesday, Dec. 22.

We have nothing important to communicate respecting this undertaking. We have received several suggestions for launching her—some correspondents proposing the use of worms and racks down the ways; others, the employment of a great number of capstans and cables; others, additional slide ways; others, the swinging of the ship round one end on a circular slide way, &c., &c. We believe nothing more is necessary than to block and shore the ship up where she is, turn out the cradles, remove the rails, and refit the cradles without them. It might be necessary to increase the inclination of the slide ways, but we cannot judge of this without data which we do not possess. The existing ways have, however, a greater inclination than ordinary launching ways for large ships.

THE IRON TRADE.

(FROM OUR CORRESPONDENT AT WOLVERHAMPTON.)

Failures and Humiliating Disclosures—Worthless Paper in Circulation—Prospect of Remedy—"Accommodation Bills"—"Currency Notes"—Nature of the Iron Trade—Requisites for carrying it on—Falling off of the Trade—Reduction of Wages—The Welsh Trade—Board of Trade Returns.

THE past month's history of the Iron Trade has been made up of a series of failures, with such accompanying exposures of the condition of a large portion of the trading community of the country as make us almost blush to have to write of them.

In every direction throughout the important coal basin of South Staffordshire—the richest mineral country, considering the extent of its area, in the world—there has been found to exist an unsoundness which is most humiliating to every one engaged in it. At the time that we write, we have not the slightest doubt that in the district named there is paper afloat fictitiously purporting to be worth half a million of money that really is not worth more than the paper and the stamp upon it. And upon this worthless stuff money and credit have been obtained, and men have attained a commercial position which unhappily has enabled them to extend very widely the evils that must follow such a practice.

The exposure of the evil, however, will go far towards effecting a cure. There now exists amongst the most substantial in the trade a strong desire to get rid of the "accommodation bill" system and "currency notes." What can be a greater lie than that told by the paper which represents such transactions as the following as real sales? A sells 1,000 tons of pig iron to B, and takes his bill, and B in a day or two sells to C, and takes his bill; and C to D, and D to E, a bill for each sale being created—"so that (as has been well put) in the course of these transactions, the iron becomes represented four or five times over in bills, and is all the time not transferred, the warrant only passing from hand to hand."

The following are well expressed careful remarks upon existing matters:—

"The numerous failures we have in the iron trade of this district very naturally suggest these questions: 1st. Is the iron trade a good business or a bad one? 2nd. Are the men who fail men of integrity, sober, industrious, possessing a knowledge of their business? And last, and perhaps not least, have they, or either of them, ever had one-fourth part of the amount for which they have failed in real capital? I think not. I believe this last question cannot be answered in the affirmative by any of the parties who have been forced to close under the present pressure; and as they have not proved themselves worthy of the high commercial position they have forced themselves into, it will be far better for the trade, for their creditors, and the country, to take what they have, and divide it *pro rata*, than either to encourage them to go on under the promise of a compromise, or sending them to the Bankruptcy Court: the latter has been very properly called a bottomless pit, from which there is no return. The iron trade is, doubtless, the finest trade in the world; but to carry it out to a successful issue, it is important for a man to have mines, capital, skilled knowledge, application, and sober habits; without these no trade can do, as it ought to do; and with these the iron trade stands first on the list of trades; but the men of capital and character suffer from the men of straw; for as long as the latter can have credit, they can and will, as long as it will last, give high wages, high prices for material, high discount to their bankers, ride and drive the best horses, drink the best wine, eat the best of all, and little, if ever, attend to business; they run into market and undersell regardless of results, which to them is a question never taken into account: and as soon as they get a bill they are seen with it at their bankers, perhaps before it is quite dry, to discount to meet some of the stuff they have created. The sooner the golden trade is purged of its impurities the better for all parties, except the few merchants, &c., who benefit from this wretched class to the extent of 20*s*. or 30*s*. per ton by finding a little ready cash, in order to spin out their commercial existence."

A more rapid falling off both in orders and also in the make of iron never perhaps took place since iron was commenced to be made as has been the case in the past and the previous month.

Of the 157 blast furnaces in fire in September last in South Staffordshire and East Worcestershire, there are not now 100; and every blast furnace may be said to make 120 tons a week.

Pig iron has fallen in price 25 per cent., and good bars cannot be sold at 10*s*. below £8 5*s*.

Wages of colliers, labourers, and furnacemen are coming down, and at the next preliminary meeting iron will be declared £1 a ton lower, and the wages of the men in the forges will be proportionately reduced.

In Wales, matters in regard to trade are worse than in Staffordshire, and a greater reduction in price has taken place.

In the Board of Trade returns for October this year is shown an increase upon the corresponding month of last year of £64,389, the figures being for this year £412,204, and for October, 1856, £347,615. The exports of iron and steel in the same periods were £1,190,651 this year, against £1,205,776 last year, showing a decrease of £15,125.

The British Workman and Friend of the Sons of Toil. 1857. London: Partridge and Co.; W. and F. G. Cash; W. Tweedie.

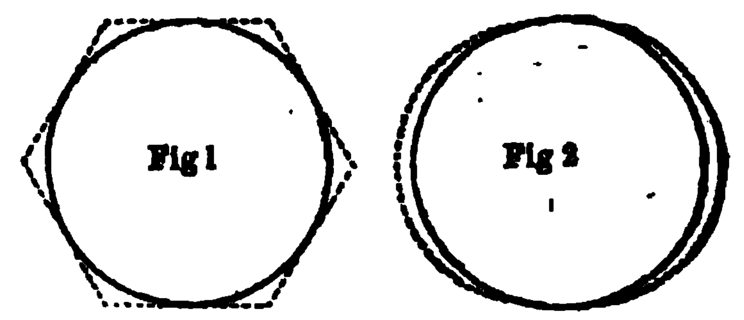
This is a cheap periodical published for circulation among that portion of our working people who are all but entirely without education. Its object is to cultivate sober and moral habits, and the manner in which the editor continually and sternly exposes the vice of intemperance, without resorting to any form of cant whatever—which is the

danger in such cases—deserves all praise. We most earnestly recommend employers to circulate the work among their labouring people, in the belief that they will thereby greatly help to check those drinking habits which do far more towards ruining the health and happiness of our populations than all other social habits combined. The *British Workman*, if energetically distributed, will prove the forerunner of many good influences of a more aspiring kind, and it is so well managed in every department that the most fastidious person need not hesitate to patronise it.

RIFLED ORDNANCE.

To the Editors of the Mechanics' Magazine.

Gentlemen,—My attention has been drawn to an article in the *Times* of to-day, headed "Mortars and Mortars." It is a great pity that a newspaper which possesses so much influence should allow itself to be made the vehicle for conveying matter so calculated to mislead the public, as that which appears in this article. So much ignorance of the subject is displayed that, coupled with the praises lavished on Mr. Whitworth's system, it bears almost the appearance of a puff. I have no wish to detract from Mr. Whitworth's merits as a first-rate mechanic, but I really cannot see how the great improvements in rifled ordnance, mentioned in the *Times*, are to be effected by the use of the hexagonal bore or triangular grooved rifling, advocated by him. It has, certainly, one advantage over the Lancaster gun; namely, that the projectile has not the wedge-like properties of the oval Lancaster shell; but this is the only one. The great defect common to all guns with which iron projectiles are used is, however, in no way remedied. This defect arises from the circumstance that, as it is necessary to allow more or less windage, it is impossible that they can fit the bore of the gun. If Mr. Whitworth's system afforded a remedy for this, it would be in some measure entitled to the high encomiums bestowed upon it in the *Times*. It does not, however, afford this remedy, and his gun (a 24 lb. howitzer, bored to a 9 lb.) has consequently proved a failure, inasmuch as neither so good a range nor precision of fire has been attained with it as with several others. In fact, by employing this method, an attempt is made to arrive at perfection by those very means which the *Times* so much deprecates; namely, by "a violation of all the laws of mechanical construction and chemical science;" for so it may be said of a system by means of which an attempt is made to obtain those results with iron (unexpanding) shot, which, from natural causes, can only be accomplished with those which fit the bore of the gun in such a manner as to cause it to be perfectly airtight. The writer of the above article in the *Times* mentions, as an advantageous circumstance, that a hexagonal bore has no grooves. I refer the reader to the accompanying diagrams, fig. 1 of Whitworth's, and fig. 2 of Lancaster's bore, both in



dotted lines. In the first figure six triangular grooves are distinctly visible. The fact is, that in the attempt to discover the best system for rifling ordnance too much attention has been paid to these matters (the shape of the grooves, &c.), which, after all, are but of secondary importance, and purely mechanical questions. If a little more science were brought to bear on the subject,—if we could even get the proper authorities to view it at all in the light of a scientific question, we should hear of much greater progress being made. The proper degree of rotary motion to be given to the shot is unquestionably the first subject for consideration; and although the best method of rifling the gun, in a manner to produce the required effect for the shot, with the least amount of friction, is of great importance, it is still but a *secondary* consideration. Although I am afraid of encroaching upon your space, I cannot conclude without noticing one sentence in the article, "Mortars and Mortars," which has puzzled me extremely. As a proof (I suppose) of the excellence of Mr. Whitworth's system, the writer observes that "the strain of the projectile being distributed evenly over every side of the polygon, iron can be substituted for lead in the projectile, and this simple but beautiful mechanical appliance at once becomes available for cannon." How is the strain equally distributed over every side of the polygon? and why can iron be substituted for lead more with a triangular grooved rifle than with any other? and why does this particular mechanical appliance at once become available for cannon more than any other? It does not require the spirit of prophecy to foretell that this system will prove as defective and as expensive as that of the Lancaster gun, for it retains nearly all its defects. I am, Gentlemen, yours, &c.,

Dec. 21, 1857. L.

P.S.—The *Times* complains of the public money having been wasted upon inventors and improvers of ordnance. I should be glad to learn who, with the exception of Mr. Whitworth, has received public money for such services.

MR. BRUNEL AND THE "LEVIATHAN."

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—The history of the world, and especially that of the past few years, proves that there is *something* in a name. Although John Bull prides himself upon his keen perception and shrewd practical common sense, he is notoriously fond of a *name*, even as he is of a lord. Doubtless the first Brunel was a great man; but does it follow that his son must necessarily be great too? He has dabbled in many great works, it is true, and methinks I hear some unhappy shareholder now saying, "Alas! he has." But will any one of his great works carry his name down to posterity as a great man—as an original thinker—as a man of genius? I think not. Nor has his last great work proved an exception to the rule. Its greatness, like that of many other works, must be estimated by the weight of material employed. With clever artizans around him, of course the ship was built; and had it been ten times the size it would have been an equally easy matter. But how far the *principle* is correct remains to be proved. One thing is certain,—as soon as a little originality of conception was required from the great *name*, a something was supplied which has signally failed. Difficulties were of course expected, and every allowance would have been made for a few minor failures. Even a few broken limbs, and the loss of a few thousands of pounds would have been regarded as a pardonable consequence of so gigantic an undertaking; but this attempt at a launch has been one succession of *pulls* and *thrusts* from beginning to end. Neither hydraulic, pneumatic, nor steam power have been brought into operation with any degree of originality of design; and yet, would not any man of real mechanical or scientific genius, with such a work before him, have brought all three into operation? or if not all, would they not have made the best use of one or more of these potent agencies? Assuredly they would. Such powers could, if properly controlled, lift the monster up in their arms and carry it to the water as easily and as softly as a mother could her child. But then, had any *outsider*—any simple inventor—seen and suggested the practicability of such a thing, what would the board of directors have said? what would the public at large have said? nay, what would even the artizans who were employed upon it have said? Why, the first question would have been, "Whose plan is this?" And if the plan, however good, were not prefaced by a *great name*, it would have been pooh-poohed as the vision of a dreamer. And thus it is from highest to lowest; talent is esteemed as nothing without the flourish of a great name. Oh! British people, you have much to learn; and it seems you are disposed to pay for the lesson. Nearly £1,000 per foot are scattered in the rear of your great *Leviathan*—£70,000 expended, and only one-third of the distance traversed! Although 100 tons pressure was formerly sufficient to move her, 250 tons will now barely suffice. Every day it is more and more difficult to get good struts for the hydraulic rams. Notwithstanding the known disadvantage of leaving the ship when she is once in motion, it would seem that labour is so scarce, that there is no possibility of having relays of hands; and thus it appears matters will go on until either ship or shareholders are ruined. And I suppose though that be the "end on't" with ship and shareholders, Mr. Brunel will still be deemed a great man. I am, Gentlemen, yours, &c.,

Caledonian-road. WILLIAM GREEN.

THE ELECTRIC LIGHT.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In your Journal for Dec., 1857, you give us an account of an electric light. Is there anything new under the sun? for, if there is, it is in the *Mechanics' Magazine* we should look to find it, and not merely a repetition of your former selves.

Your exemplifications of all the previous efforts to overcome what you in your article desiderate the great difficulties in the electric lights are erroneous, and seem only to point to the defects in the lamp used by a Company once existing, designated the Electric Power Light and Colour Company, the action of which lamp answers your description.

You also mention that, in 1852, Mr. Allan introduced a very excellent rotating electrode, whereby equal distance could be maintained by mechanical rotation of one or both electrodes. This registration having long since expired, it is somewhat late in the day to make a fuss and patent out of a principle long since public property. If you will refer back to your own Journal of Nov. 13, 1852, you will find the principle of maintaining equi-distance propounded in almost the same words as in your article of Dec. 12, 1857, even to the reference in the last few lines of its application to lighthouse purposes.

It is to you, Messrs. Editors, we look to keep us right as to what has been previously done in this interesting subject, and tell us rather to look to our batteries, and seek improvement there, that being the stumbling-block to the economical and practical application of the electric light to useful purposes. I am, Gentlemen, yours, &c.,

A READER OF LONG STANDING.

Edinburgh, Dec. 18, 1857.

[We perfectly well remember what we

said in 1852, but are not aware that our recent article in any way clashes with it.—EDS. M.M.]

BUILT-UP GUNS.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—From your No. 1792, it appears that Mr. Mallet and Captain Blakely are contending civilly but fiercely as to the priority of inventions in such ordnance. I beg to state that I made a very neat model of a monster mortar in *hard wood*, and cased it round with the best iron wire, and so strengthened it that I used to fire it. I may add, too, that I used to show off its efficiency by firing it with electricity without a touch-hole. This was in the winter of 1854-55, certainly before Mr. Mallet, in June, 1855. I did not trouble Mr. Clark's book on the Britannia Bridge, to find the germ of the whole thing; for I found it many, many years ago, in old Mons Meg, in Edinburgh Castle.

Apropos of Mons Meg; it will not do for artillery officers to turn up their noses at the construction of Mons Meg. We must go back to the period at which she was built, and not compare her with ordnance of the present day, for point-blank firing. She was intended, from an eminence, at a high elevation, to pitch a big stone ball,—a small step in advance of the ancient catapulta. Some such like ordnance we know to have been used at the gates of the Dardanelles in days long gone by, throwing a stone ball into one of our ships passing. I am, &c.,

A GREAT GUN.

Dec. 16, 1857.

To the Editors of the Mechanics' Magazine.

GENTLEMEN,—In reading the correspondence between Mr. Mallet and Captain Blakely on the construction of ordnance, and the claim on the part of both those gentlemen for priority of design, it occurred to me that a letter, which you very kindly inserted in your Journal of the 20th January, 1855, contained the principle in the rough on which these gentlemen have constructed, or propose to construct, their instruments. The paragraph I allude to is as follows;

> That the cannon should be made of a comparatively thin cast material, and incased in a very accurately and strongly-wrought covering. Such covering being affixed by means of screws and nuts, or by collars or rings driven on in the same manner as railway-wheels are to their axletrees.

Now should it be as I have surmised, and the principle of construction the same, the question of priority would no longer concern either Captain Blakely or Mr. Mallet, the earliest date either of them giving being the 18th June of the same year, five months after the insertion of the letter referred to.

JOSEPH CLARKE.

London, Dec 21, 1857.

SPECIFICATIONS OF PATENTS RECENTLY FILED.

JOY, D. *Improvements in steam engines.* Dated Apr. 3, 1857. (No. 929.)

The 1st and 2nd parts of this invention relate to engines known as "Woolfe's plan." The other parts are applicable to engines of ordinary construction. The 1st part consists in so arranging the cylinders as to make the piston of the first or high pressure cylinder serve as the steam valve to the second or low-pressure cylinder, the exhaust parts of the former being the steam or inlet parts to the latter. The 2nd part consists in a mode of applying a small steam cylinder with piston, rod, and valve to work the exhaust valve of the low pressure cylinder, so arranged as to move the said valve quickly just at the end of each stroke of the piston, and when there is the least pressure upon the valve. The other part requires reference to drawings.

PAGET, A. *Improvements in machinery or apparatus for the manufacture of looped fabrics, and in the manner of constructing the same.* Dated Apr. 3, 1857. (No. 930.)

This cannot be described without engravings.

CRADDOCK, T. *Certain improvements in the steam engine and steam boiler.* Dated Apr. 3, 1857. (No. 931.)

We shall probably give some account of these improvements in a future article.

WHITEHEAD, T. *Improvements in spinning flax, tow, and hemp.* Dated Apr. 3, 1857. (No. 932.)

This relates to that process of spinning in which the ordinary hot water frame is used. It consists simply in repeating the process of spinning the material either twice or several times. In the second or third, or any further process of spinning, the material operated upon should be made to pass again through hot or cold water.

BAUDOUIN, F. M. *Improvements in the wires or conductors of electric telegraphs, and in the machinery for the manufacture thereof.* Dated Apr. 3, 1857. (No. 933.)

The patentee insulates telegraph wires by alternate coatings of insulating matters, and covering bands, or tapes of textile fabrics, which are themselves prepared with insulating matters, each layer being compressed, and the continuity of the same preserved throughout. Among the substances suitable for producing good insulating coatings are bitumens.

JOHNSON, J. H. *Improvements in the treatment of floss silk.* (A communication.) Dated Apr. 3, 1857. (No. 934.)

The floss silk is placed in a solution of caustic soda, caustic potash, or ammonia and water, heated to about 176° Fahr. The requisite time for it to remain therein can be

ascertained by the naked eye. It is then withdrawn and washed in pure water. If the material is to be dyed black, it is placed in a solution of sulpho-nitrate of iron; then washed, again immersed in a solution of caustic soda, potash, or ammonia, then washed, and afterwards plunged into an acidulated solution of prussiate of potash, and again washed. The silk is next galled by being steeped in extract of chestnuts, after which it is again washed, and the process is complete.

BOURNE, J. *The generation and application of motive power.* Dated Apr. 4, 1857. (No. 935.)

This invention is described at p. 610 of this number.

SPENCER, G. *Improvements in machines used for facilitating the discharge of coals, minerals, earths, and other similar materials, from waggons used on railways, tramways, and common roads.* Dated Apr. 4, 1857. (No. 938.)

The inventor places under the two ends or sides of tipping platforms (as an end, or side tip may be required), rockers, so contrived that the curved surfaces are described by a radius having for centre as near as may be the centre of gravity of the tipping platform and loaded waggon. Thus brakes to ease the loaded waggon down are rendered unnecessary.

ADLER, E., and F. B. HOWELL. *Improvements in machines for cleaning knives and other similar articles.* Dated Apr. 4, 1857. (No. 939.)

This consists—1. In securing to a platform one or more knives by the blades in preference to the handles. 2. In substituting for the usual rotary or rectilinear reciprocating motion a to-and-fro motion in the arc of a circle.

RENSHAW, C. *Improvements in self-acting differential valves.* Dated Apr. 4, 1857. (No. 942.)

The inventor employs mercury placed in a vessel or cistern in connection with a tube at the top of which is an air-tight receiver. In the cistern is placed a float, to which the valves are connected by a rod. The valves rise up and down, or off, or upon their seatings according to the level of the mercury.

MILNES, J., and F. W. MOWBRAY. *Improvements in lubricating the pistons and valves of steam engines.* Dated Apr. 4, 1857. (No. 944.)

This consists in fixing on the pipe near the throstle valve a case containing tallow, through which a small piston works. In this piston is a small hole, so that when it is in one position the hole is in the tallow, and when it moves to another it carries with it, in the hole, a supply of tallow into the pipe; the steam then blows the tallow melted into the cylinder, lubricating the piston and valves.

BIRKIN, R., jun., and T. I. *Improvements in the manufacture of figured lace.* Dated Apr. 4, 1857. (No. 945.)

This consists in forming the breadths of such lace in transverse lines or horizontally on the machine in place of vertically.

TESTELIN, E. *A new system for the application of electricity as moving power.* Dated Apr. 4, 1857. (No. 947.)

This invention comprises several features which cannot be described without engravings. They consist in certain methods of using electro-magnets, &c.

JOHNSON, J. H. *Improvements in the manufacture of hard India-rubber.* (A communication.) Dated Apr. 4, 1857. (No. 948.)

The inventor proposes to mix with the raw India-rubber, after it has been cut and dried and well broken under rollers, about half its weight of finely-powdered sulphur and a similar quantity of finely-powdered coal, or of saw dust. The whole is then mixed, made into sheets, and vulcanized. He also proposes to use moulds of hard India-rubber.

SUMNER, W. *Improvements in machinery or apparatus for preparing, slubbing, and roving fibrous materials.* Dated Apr. 4, 1857. (No. 949.)

This invention relates to "flyers." Under one modification, as it relates to single centrifugal presser flyers, the pressure lever which conducts the slubbing or roving from the flyer tube to the spool or bobbin is attached to the lower end of a vertical connecting rod, supported in bearings on the flyer tube. The upper end of this rod is connected to a short weighted lever arm, the centrifugal action of which, during rotation, gives the required pressure to the slubbing or roving being laid on to the bobbin by it. The weight being suspended from the lever at the centre, should the weight from any cause get removed from its perpendicular position, a counterpoise power will always be found at one end to add to that part of the weight which has suffered a decrease of power through derangement, thus equalising its balance whatever its position.

JOHNSON, J. H. *Improvements in steam-hammers.* (A communication.) Dated Apr. 4, 1857. (No. 950.)

This consists—1. In arranging steam hammers with a lateral reservoir and steam jacket to the steam cylinder, so that the piston will be elevated by the action of the steam in the reservoir in communication with the bottom of the cylinder by a spring of any convenient construction, the steam acting from above. 2. In the use of a cir-

cular equilibrium distributing valve, which is easily worked, and may be applied to existing hammers. 3. In working the valve either by hand with the aid of a spring, or by means of the hammer itself. 4. Of a buffing arrangement for deadening the shocks and preventing the breakage of the piston rods. 5. In raising or lowering the position of the hammer (which is made hollow) on the piston rod. 6. In lubricating the hammer guides, by collecting the grease or oil which falls from the stuffing-box, and directing it thereto. 7. In the use of bars of iron or pieces of timber, against which a buffer on the hammer strikes when the latter is unduly elevated. 8. In a mode of working the valve by the continuous rotary motion of a cam or eccentric, or by any motion independent of the hammer itself.

JOHNSON, J. H. *Improvements in preserving food.* (A communication.) Dated Apr. 4, 1857. (No. 951.)

This consists in the application of an air-tight covering of gutta percha or caoutchouc. The food is immersed once or oftener in a liquid formed of the above material.

PERKS, W., jun. *A new or improved manufacture of crown and sheet glass.* Dated Apr. 4, 1857. (No. 954.)

This consists in polishing crown and sheet glass by pressing it upon a horizontal rotating disc, the upper surface of which is covered with a polishing mixture, the sheets of glass being held stationary by stops.

MELLING, T. *Improvements in taps or valves, and in apparatus to prevent the overflowing of, and letting off, the water from baths.* Dated Apr. 6, 1857. (No. 957.)

This consists in opening and closing inverted taps or valves by a quick threaded screw and eccentric inclined disc. Also in the application of a similar circular disc plate to the working of a conical valve for letting the water off baths, and to prevent their overflowing by means of a double pipe open at the top and furnished with a partition corresponding in height to the level of the water in the bath when full.

BOUSFIELD, G. T. *Improvements in treating India rubber and gutta percha, in order to render the same impermeable to illuminating and other gases.* (A communication.) Dated Apr. 6, 1857. (No. 959.)

This consists in applying linseed oil, in a heated state, to the surfaces of tubes of vulcanised India rubber or gutta percha when in a heated state.

CLARKE, S. *Improvements in the manufacture of candles and night lights.* Dated Apr. 6, 1857. (No. 961.)

This relates—1. To a mode of preparing rushes to be used as wicks. 2. To making night lights so that a considerable portion of the tallow shall be above the case in which it is burned. The first part consists in subjecting rushes to be used as wicks to a solution of borax and ammonia, to ensure their consuming as they turn out from the flames of the candles. Each night light is formed with a shallow box or holder, or so that it may be consumed in a separate comparatively shallow holder.

NEWTON, A. V. *An improvement in the construction of smoothing irons.* (A communication.) Dated Apr. 6, 1857. (No. 963.)

This invention cannot be described without engravings.

SLACK, J. *Improvements in lubricating certain parts of looms for weaving.* Dated Apr. 6, 1857. (No. 964.)

This relates to lubricating the spindles of the picking motion of looms. To effect this the inventor applies a piece of sponge for conveying lubricating material in such a position that the vibrations of the slay will bring the spindle in contact therewith.

GOODYEAR, C. *Improvements in the manufacture of waterproof boots and shoes, applicable also in part to boots and shoes of other kinds, and to other outer coverings for the feet.* Dated Apr. 6, 1857. (No. 966.)

This relates—1. To uppers for boots and shoes, the object being to provide at a small cost a waterproof material, to form uppers having the appearance of a compound of cloth and glazed leather. The material consists of perforated sheet India rubber with vulcanized sheet rubber placed on the face of it with cement. The uppers so completed are submitted to pressure between dies or plates, one of which is grooved to form corrugations on the inner face of the fabric, which when the material is made up assist the ventilation of a boot or shoe. 2. To boot and shoe, heels and soles. The heel is moulded of hard India rubber, making the same hollow to receive a filling piece of elastic substance, which projects beyond the edge of the enclosing case, so as to form a cushion for easing the blow of the heel when it strikes upon the ground.

ROGERS, E. *Improved methods of applying fuel for heating purposes.* Dated Apr. 7, 1857. (No. 970.)

This consists—1. In converting the combustible parts of coal, coke, &c., into gases by imperfect combustion under a blast of cold air, in a close blast furnace, without fire-bars, and with a receptacle below the blast pipe or tuyere from which the fused earthy parts of the fuel may be occasionally drawn off. 2. In converting coal, tar, gas refuse, &c., into combustible gases by mixing them with coke or other solid fuel, and burning them as above described. 3. In leading the gases generated as above

through flues to the furnace where the heating effect is to be produced, and immediately behind the place where the combustion is to be effected a blast of cold atmospheric air enters to mix with them. 4. In delivering the gases through flues or pipes to private houses, shops, &c., in order to be burnt for heating purposes.

PITMAN, J. T. *Improvements in apparatus called fire-escapes.* (A communication.) Dated Apr. 7, 1857. (No. 973.)

This invention consists of a series of extension ladders connected together, in combination with baskets operated with cords and pulleys, and a mode of communicating with the different storeys of buildings by means of platforms.

PEARSON, G., and E. JESSOP. *Improvements in sewing-machines.* Dated Apr. 7, 1857. (No. 974.)

The patentees employ a spiral needle. The vertical needle forms the loop in the usual way, through which the spiral needle carries the under thread about an entire revolution, and there remains until the vertical needle descends through the material to be sewn; the spiral needle then moves in the opposite direction, leaving the under thread round the said vertical needle, thereby forming the stitch.

ROBINSON, J. *An improved apparatus for driving or giving motion to power looms, which said improvement is also applicable to driving other machinery.* Dated Apr. 7, 1857. (No. 976.)

This relates to the pulleys round which the driving strap passes, and by which the loom is put in motion, and is intended to adjust the driving to the different motions of the loom, and to prevent the slipping of the driving strap, by means of a certain pulley which may either be fixed or loose as required.

FINCH, E. *An improvement in railway brakes.* Dated Apr. 7, 1857. (No. 977.)

The end of the brake lever is arranged so as to move on the axis by which the brakes are actuated; and the brake lever has attached to it a worm, which takes into a worm wheel on the axis, so that, as the blocks are worn away by turning the worm attached to the brake lever, the position of the lever can be adjusted so as always to retain the same position in relation to the carriage or waggon.

GALE, W. S. *Improved means for rendering the joints of engines or other machinery, steam or fluid tight.* Dated Apr. 7, 1857. (No. 979.)

This consists in the use of alternate ribs and intervening grooves applied at those parts of engines or machines that are subjected to motion, which said ribs and grooves become a complete substitute for the packings.

BRIERLY, H. *Improved mules or machinery to be used in spinning.* Dated Apr. 7, 1857. (No. 980.)

This consists of mechanism for producing that movement of hand and self-acting mule carriages termed the second stretch or after draught. It also has reference to the operation termed "governing" the winding-on motion of self-acting mules. It requires engravings to illustrate it.

PROVISIONAL SPECIFICATIONS NOT PROCEEDED WITH.

HUSBAND, R. *Certain improvements in the manufacture of hats and other coverings for the head, and in the instruments employed in the said manufacture.* Dated Apr. 2, 1857. (No. 914.)

This consists—1. In the substitution of metal for wood in the blocks employed. 2. In making blocks hollow. 3. In the application of heat inside the blocks. 4. In making blocks so that their parts when put together will adhere to each other without external pressure; and, 5. In employing the improved blocks in old and new processes, in making up bodies for, and in finishing hats, &c.

HOLDEN, H. A. *Certain improvements in carriage lamps and general carriage and harness furniture and fittings.* Dated Apr. 2, 1857. (No. 915.)

The object here is to use zinc in manufacturing the above articles (instead of copper plated with silver), the same to be electro-plated or burnished.

BROOMAN, R. A. *Improvements in treating and bleaching fibrous vegetable substances, and in machinery employed therein.* (A communication.) Dated Apr. 2, 1857. (No. 919.)

Plants or fibres are placed in large cisterns, and leys are added, to obtain caustic retting. The cisterns may be heated by steam. They are next passed through a breaking or decorticating machine, to open up the fibres and separate foreign matters from them, and are then fed on to an endless belt, which delivers them on to a shoot, whence they fall between a hollow plate and a rotating drum with a roughened surface. They are next received into a trough and washed in clear water. The fibres being now deprived of the greater part of the gum, resin, &c., the ley, which is about to be explained, removes the remainder of these substances, completes the separation of the filaments, and commences their decoloration. A rotating closed boiler is charged with the barked and washed filaments, and water introduced; and for every 200 lb. of

filamentous matters are added 2 lbs. of subcarbonate of soda crystalized, and 8 or 10 quarts of liquid chloride of lime at 2° to every 100 quarts of pure water. When the fibres have been exposed to these agents for a time, they are removed to a double-acting washing, opening, and separating machine, fed with clear cold water. Here they are continuously subjected to the action of armed cylinders and plates and of washing drums. When sufficiently washed, the quantity of water is diminished, and the bleaching commenced by introducing some of the bleaching agents set forth in a provisional specification filed by the applicant 2nd Dec., 1856, No. 2851. After a time these agents are drawn off, cold water is introduced, and the fibres are subjected to another washing, and then removed to another vessel, where they receive their final bleaching. The bleaching agents are then drawn off, clear water is introduced, and washing drums are set in motion to finally wash the fibrous matters.

HARDMAN, W., and J. DUGDALE. *Improvements in machinery for preparing cotton, flax, wool, or other fibrous materials.* Dated Apr. 3, 1857. (No. 922.)

This relates to presser flyers which act by centrifugal force, and are used in slubbing and roving frames. It consists in applying at the upper part of the leg of the flyer a lump of metal, in which is formed a centre, in which turns a light rod, at the lower end of which is attached the presser. This centre is in such a position that the rod, by its centrifugal force, when the flyer is in action, produces the necessary pressure by which the presser compresses the slubbing or roving on to the bobbin or spool. A modification of the above is also given.

HOLLAND, W. *A new or improved manufacture of runner notches and top notches for umbrellas and parasols.* Dated Apr. 3, 1857. (No. 924.)

The inventor takes wire having a section resembling the letter U, which has been bent into a trough-like form. He coils the said wire upon a mandril, so as to form a corkscrew-like coil, the open side of the U-shaped wire being turned outwards in coiling. He then cuts the coil so as to divide transversely each turn of the coil, and thereby makes a series of rings. He brings the ends of each ring together, and joins them by soldering. The trough-like form of the ring constitutes the groove in which the wire forming the axis of the joints lies.

BARKER, S. *An improvement or improvements in the manufacture of steel.* Dated Apr. 3, 1857. (No. 925.)

This consists in the manufacture of steel from waste pieces of wrought or malleable iron. The effect is produced by heating the said scrap in contact with carbon.

TAPLIN, W. H. *Improvements in the construction of fire-places and stoves.* Dated Apr. 3, 1857. (No. 926.)

This is intended to facilitate the extinction of fires in ordinary fire-places. It is proposed to make the grate or grid loose, and capable of being either turned downwards on hinges or pivots, or of sliding forwards or outwards, and to employ a moveable pan or box under the grate, into which the fire may be dropped, and which may be closed with a lid; or a moveable screen may be placed in front of the ash-pit to exclude the draught.

TOUSSAINT, J. F. *A method for facilitating the examination and discovery of fissures, flaws, deteriorations in the inserted or hidden parts of axles or other like pieces of machinery subject to decay and rupture.* Dated Apr. 4, 1857. (No. 936.)

This cannot be described without engravings.

HARVEY, H., and R. SMITH. *Improvements in raising sunken ships, or other vessels, and all other matters and things, from under to the surface of the water, and to prevent their sinking.* Dated Apr. 4, 1857. (No. 937.)

This consists in the use of balloons or inflatable collapsing machines, the same to be filled with gas, and attached to the things to be raised.

ADLER, E., and R. P. ABERNETHY. *Improvements in machines for cleaning knives and other similar articles.* Dated Apr. 4, 1857. (No. 940.)

This mainly consists in providing two rollers with elastic surfaces rotating in bearings, so as to act on both surfaces of the knives (which are held on a frame) at once, similar to the action of rollers in a rolling mill. They pass between the rollers with their lengths parallel to the axis of the rollers.

AUSTEN, J. *Certain improvements for extracting silk and other textile and vegetable substances from the bark and leaves of every description of mulberry trees.* Dated Apr. 4, 1857. (No. 941.)

The wood is steeped in hot water to get off the bark, which latter is then dried and crushed to obtain the *liber;* by macerating the same further in an acid solution, the cambrium is dissolved. The bark is then washed in cold water, submitted to an alkaline solution, washed again in cold water, and finally crushed, when a pure fibrous material is obtained. The leaves are treated like the bark.

LECLERCQ, A. *Certain improvements in sleepers of railways.* Dated Apr. 4, 1857. (No. 943.)

This is applicable for ordinary lines, and

for rails and tramways in mines, quarries, &c. It consists in forming metal sleepers and chairs in one piece.

MEAD, J., and G. *Improvements in metallic and other packing-boxes or cases.* Dated Apr. 4, 1857. (No. 946.)

Here sheet metal is folded in one piece to form the body of the box, or case, which is secured down one side with a lap joint or rivets. Within one or both ends is a rim or ring to strengthen the same, and the edges of the metal may be turned over outwards, so as to permit the head piece to slide over it by having its edges lapped. The lap edges may then be hammered down close, and cannot afterwards be opened without cutting or forcing the metal.

HARVEY, J. P. *Improved machinery for crushing land or clods.* Dated Apr. 4, 1857. (No. 952.)

This consists in mounting sets of discs (with corrugated or indented edges) on one shaft, each set being independent of the others. The discs are loose on the shaft, but cannot revolve independently of each other as they are connected by loose clutches, which will, however, admit of their having a epaeɪɐamotion of about half an inch, for enabling them to clear away earth that may stick between them. The discs are so arranged on the shaft that the projections of each are opposite to the indentations of the adjoining ones.

HANSOR, J. *Improvements in apparatus for consuming gas.* Dated Apr. 4, 1857. (No. 953.)

This relates—1. To a mode of adjusting the supply of air to argand burners to suit various pressures and qualities of gas. The inventor mounts the deflector loosely on a central stem, which stands up from the arms of the burner, and this stem he taps with a course thread to receive the deflector, and permit of its being raised and lowered as desired. By this means he enlarges or reduces the chamber of air formed by the cylinder of flame and the deflector, and so determines the supply of oxygen according to the exact amount required.

RIPPON, J. J. *A new or improved instrument or apparatus for straining or filtering colours.* Dated Apr. 4, 1857. (No. 955.)

This consists of a piston working lightly in a cylinder. The piston is not solid, but consists of a frame, on which a filtering fabric is supported. The piston is forced to the bottom of the cylinder, and the colour is poured on the piston. The piston is then raised in the cylinder, when a vacuum is formed underneath it. The atmospheric pressure forces the colour through the piston into the vacuum beneath.

RIPPON, J. J. *An improvement or improvements in rollers or cylinders for printing fabrics.* Dated Apr. 4, 1857. (No. 956.)

This consists of a tube of iron and a tube of copper fitting upon it, but capable of being removed, so that another copper cylinder may be used. The iron cylinder fits upon the ordinary mandril. The copper cylinder is prevented from turning upon the iron cylinder by ribs in its interior engaging in grooves.

PREDAVALLE, B. *A new motive power.* Dated Apr. 6, 1857. (No. 958.)

This consists in the action, alternately intercepted and restored, of the vertical pressure of liquids on a base, and the ascent of liquids by capillary attraction.

BURRELL, C. *Improvements in portable steam engines suitable for agricultural purposes.* Dated Apr. 6, 1857. (No. 960.)

This consists of applying chain wheels to the shafts driven by such steam engines, and also to the running wheels, and by means of endless chains to give motion to the running wheels of such carriages.

GOODYEAR, C. *An improved manufacture of waterproof fabric, applicable as a substitute for leather, prunella, embroidered and other ornamental fabrics and stuffs.* Dated Apr. 6, 1857. (No. 965.)

This relates to the covering of cloth or canvas, to which india rubber and its compounds have been applied, with flock made from wool, silk, eider down, leather dust, &c.

TAYLOR, J. H. *Improvements in regulating the flow of fluids.* Dated Apr. 6, 1857. (No. 967.)

This consists in the use of a cylinder fitted with a piston and valve, connected to the handle (of the closet, for example.) The lower portion of this cylinder is always open to the main supply pipe, whilst its upper portion opens into a chamber fitted with a flexible diaphragm, on which rests a rod connected with a weighted lever, which opens and closes the closet supply valve. A diaphragm also keeps this water-tight. The bucket, on being raised by lifting the handle, forces a certain amount of water into the diaphragm chamber, and elevates the diaphragm, which, in its turn, raises the weighted lever, and opens the supply valve, such valve being kept open until the water has escaped from below the diaphragm, which may take place through a small valve serving to prevent the water returning to the cylinder again.

SIBLEY, L. J. M. *An improved pulp for the manufacture of paper.* Dated Apr. 6, 1857. (No. 968.)

The pulp is composed of chloride of lime, 2 parts; alum, 2 parts; carbonated colours, 3 parts; linseed oil, 15 parts; gum copal, 10 parts; acetate of lead, 10 parts; turpentine, 20 parts; essential oil of turpentine, 15 parts; nut oil, 17 parts; cotton, 30 parts; flax, 30 parts; white lead, 20 parts; wheaten flour, 40 parts.

PROVISIONAL PROTECTIONS.

Dated August 11, 1857.

2147. Richard Husband, of Manchester, hat manufacturer. An improvement in the manufacture of hats.

Dated November 2, 1857.

2784. James Apperly, cloth manufacturer, and William Clissold, engineer, both of Dudbridge, Gloucester. Improved means of, and apparatus for, feeding fuel to furnaces.

Dated November 3, 1857.

2794. Anthony Charles Sacré, sen., of Brussels, mechanical engineer. An improved apparatus for measuring water.

Dated November 25, 1857.

2942. Frédérique Lemaire, of Tavistock-street, Covent-garden, lithographer. An improved petticoat for ladies' wear. A communication.

2944. Frederick Herbert Maberly, of Stowmarket, Suffolk, Master of Arts. An improved general polishing machine or apparatus.

2946. Camille Bernard, of Paris. Certain improvements in heating apparatus. A communication.

2948. Edmund Charles Tisdall, of Holland-park Farm, Kensington, farmer. Improvements in the mode of preserving animal and vegetable fluids and fluids containing animal and vegetable substances.

Dated November 26, 1857.

2950. William Blinkhorn, of Sutton, near Saint Helens, Lancaster, manager. Certain improvements in machinery or apparatus for grinding and smoothing and for polishing glass.

2952. John Frederick Shoner, of Church-street, Kennington, baker. Improvements in common road carriages.

2954. Joseph Ruston and James Toyne Proctor, of Lincoln, engineers. An improved arrangement of machinery for dressing grain.

Dated November 27, 1857.

2956. William Bowers Taylor, of Ballymena, Ireland, dyer. Improvements in driving looms for weaving.

Dated November 28, 1857.

2960. Benjamin Peach, of Leicester, gentleman. Sundry improvements in bedsteads, elastic bed bottoms, the seats of chairs, sofas, and other similar articles. A communication.

2964. Antoine Alphonse Chassepot, of Paris, gun maker. Improvements in breech-loading firearms.

2966. Robert Tindall, jun., of Fraserburgh, Aberdeen, engineer. Improvements in harpoon guns and ammunition.

2968. Frederic Groom Grice, of West Bromwich, manufacturer. New or improved machinery for the manufacture of bolts, spikes, rivets, screw blanks, and other articles of like manufacture.

Dated November 30, 1857.

2970. John Nichols, of Pendleton, near Manchester, cotton spinner. Improvements in machinery or apparatus used for sizing yarns or threads.

2972. Thomas Kaye, of Grange Moor, near Dewsbury. Improvements in looms for weaving.

2974. Pierre Ambroise Montel, of Paris, civil engineer. An improved motive power.

2976. Daniel Kinnear Clark, of Adam-street, Adelphi, civil engineer. Improvements in furnaces for promoting the combustion of fuel without smoke and the communication of heat, especially adapted to steam boilers.

2978. James Howard, of Bedford, agricultural implement maker. Improvements in the construction of ploughs.

Dated December 1, 1857.

2984. Richard Hipkiss, of Birmingham, metal roller, and William Olsen, of Birmingham, machinist. Improvements in lubricating shafts and axles and other articles requiring lubrication.

Dated December 2, 1857.

2987. Edward Clarence Shepard, of Jermyn-street, esquire. Improvements in magneto-electric machines.

2988. John Summers, of Stalybridge, Chester, manufacturer, and David Wormald, of Dukinfield, same county, mechanic. Improvements in machinery for manufacturing clog irons and heels and tips for boots, or other coverings for the feet.

2989. Joseph Eccles, of Blackburn, cotton spinner. Improvements in drying and coloring, or ornamenting bricks, tiles, pipes, and other articles made of plastic earths.

2990. Joseph Hetherington, of Birmingham, brass founder. A new or improved manufacture of the bowls of castors for furniture.

2991. William Bird, of Blackburn, machinist, Richard Ashton, of the same place, overlooker, and Thomas Bird, of Manchester, engineer. Improvements in looms and pickers for looms.

2992. William Thomson, of Dalkeith-park-gardens, Mid Lothian, gardener. Improvements in machinery or apparatus for propelling ships or vessels.

2993. Charles Jean Michel Moireau, merchant, of Passy, near Paris. A composition to be used as a substitute for bees' wax.

2994. John Fowler, jun., of Cornhill, and William Worby, of Ipswich. Improvements in apparatus used when ploughing, tilling, or cultivating land.

2995. Joseph Francis, of the United States, and Charles Manby, of Great George-street, Westminster, C.E. Improvements in the manufacture of waggons and other vehicles, applicable to the transport of troops and military and other stores on land and water.

2996. Alexander Parkes and Henry Parkes, of Birmingham. Improvements in the manufacture of sheathing metals.

2997. John Livesey, of New Lenton, Nottingham, lace manufacturer. Improvements in the manufacture of pile fabrics, and in the machinery employed therein.

Dated December 3, 1857.

2998. Louis Frederic Ernest Ciceri, of Paris, artist. Improvements in the preparation of white as a basis of colour.

2999. George Tomlinson Bousfield, of Loughborough-park, Brixton. Improvements in collapsible boats. A communication.

3000. Robert Hazard, of Thanet-place, Temple-Bar, engineer. Improvements in a self-acting reclining chair or couch.

3001. Elijah Slack, of Glasgow, manufacturing chemist. Improvements in the treatment, application, and use of wheat and other grains and amylaceous vegetable substances.

3002. John Reeve, of Rutland-gate, gentleman. Improvements in propelling vessels.

3003. Charles Henwood, of Oxford, engineer. An improved arrangement of galvanic battery suitable for medical purposes.

3004. William Parsons and James Attree, of Brighton, engineers. An improved cock or tap and flushing apparatus.

Dated December 4, 1857.

3005. James Buchanan, of Liverpool, engineer. Improvements in smoke consuming apparatus, applicable to boiler and other furnaces.

3006. Abraham Ripley, of Saint Helens, Lan-

caster, engineer. Improvements in mills for grinding myrabolams, valonia, bark, and other similar substances.

3007. James Hamilton, of Halifax, York, wire-worker. Improvements in the construction of strained wire fencing for dividing fields, parks, and pleasure grounds.

3008. Henry Deacon, of the Woodend Chemical Works, Widnes Dock, near Warrington, manufacturing chemist. Improvements in the manufacture or production of soda and potash.

3009. John Rubery, umbrella manufacturer, of Birmingham. Certain improvements in the manufacture of umbrellas and parasols, and in the application of a new condition of material to the production of some of the parts thereof, that has not heretofore been used for that purpose.

3010. Julien d'Helle, civil engineer, and Albert Viscount de Waresquiel, gentleman, both of Paris. Improvements in railway rolling stock.

3011. Samuel Henry Sewers, of Curry Rivel, Somerset. An improved powder for dusting turnips, and machinery for distributing the same, which may be employed for similar useful purposes.

3012. Joseph Grizard, of Nevers, France, watchmaker. Improvements in watches, and in the means of or for winding up and setting watches.

3013. William Standring, of Bury-road, Rochdale, doffing plate maker. An improved throstle and mule spring for the under clearers of spinning machines.

3014. Alexander Morton, and James Howden, of Glasgow, engineers. Improvements in obtaining motive power.

Dated December 5, 1857.

3015. Stanislas Jules Count Ostrorog, of Paris, a wind musical instrument.

3016. William Caldwell, of Liverpool, engineer. An improved fluid meter which may be used as a motive power engine.

3017. Marc Antoine François Mennons, of Rue de l'Echiquier, Paris. Improvements in lucifer matches. A communication.

3018. William Mercer, William Bodden, and William Higginson, of Oldham, spindle and flyer makers. Improvements in certain parts of machinery for slubbing and roving cotton.

3019. Thomas Sidebottom Adshead, of North End, near Stalybridge, Chester, cotton spinner, and Abraham Holden, of the same place, cotton carder. An improved self-acting combination of machinery for the grinding of carding engine rollers.

3020. William Thomas Henley, of St. John-street-road, telegraph engineer. Improvements in ropes and cables for telegraphic or other purposes, and in machinery used in the manufacture of such and other ropes and cables.

3021. John Brinton, of Kidderminster, carpet manufacturer, and James Crabtree, of the same place, mechanic. Improvements in the preparation of weft yarn to be used in the manufacture of carpets and other pile fabrics.

3022. James Sinclair, of Hill-street. Improvements in machinery or apparatus for cutting or dividing stone and marble.

3024. William Edward Newton, of Chancery-lane. Certain improvements in apparatus for laying submarine telegraphic cables. A communication.

Dated December 7, 1857.

3025. Daniel Hiley and Percival Hiley, of Bradford, York, mechanics, and William Hargreaves and Enoch Haley, also of Bradford, iron manufacturers. Improvements in power looms for weaving worsted, cotton, silk, woollen, and other fibrous substances.

3028. James Stiff, of High-street, Lambeth. Improvements in drain pipes.

3029. George C. Greenwell and William Selby, of Radstock, Somerset. An improved machine for washing coals and other minerals, and for separating them from other substances.

3030. James Harris, of Hanwell, engineer. Improvements in signalling, and in apparatuses employed therein, part of which is applicable to the compression and exhaustion of air and other fluids.

3031. Robert and John Reeves, of Bratton, Wilts. Improvements in implements for depositing seed and manure.

Dated December 8, 1857.

3032. George Holcroft, of Manchester, and George Denholm, of Wigan, consulting engineers. Certain improvements in steam engines.

3033. Benjamin Shaw, of Wellington, Salop, builder. An improvement or improvements in the construction of windows.

3034. Henry Pershouse, of Birmingham, manufacturer. An improvement or improvements in stereoscopes.

3035. Edmund Outram, of Leeds, engineer. An improved steam regulator.

3036. Charles Nightingale, of Wardour-street, Soho, bedding manufacturer. Improvements in machinery for feeding hair and fibres intended to be spun or twisted.

3037. Henry Dolman, of Nelson-street, Greenwich. An improved stand for cheval and other dressing glasses.

3039. William Edward Newton, of Chancery-lane. Certain improvements in obtaining motive power. A communication.

3040. William Rowan, of the firm of John Rowan and Sons, engineers and ironfounders, of Belfast. Improvements in spinning flax and other fibrous material, in preparing the same for weaving, and in the machinery employed therein.

3041. Richard Archibald Brooman, of 166, Fleet-street, London, E.C., patent agent. Improvements in cocks and valves for regulating the flow of fluids. A communication from P. J. Guyet, of Paris.

NOTICES OF INTENTION TO PROCEED.

(From the "London Gazette," December 22, 1857.)

2135. I. Oschinsky. An improved soap to which he gives the name of rheumo-arthritic soap.

2140. J. Roberts, Jun. Improving the combustion of fuel and preventing the escape of fuliginous smoke from shafts and flues.

2144. P. A. Godefroy. An improved method of desulphurising mineral matrix for the extraction of auriferous, argentiferous, and other metals contained therein.

2145. G. Chambers. Improvements in separating cinders from ashes, and economizing fuel.

2147. R. Husband. An improvement in the manufacture of hats.

2148. W. L. Groundwater and H. Prince. Improvements in pumps.

2150. T. Hardcastle. Improvements in machinery for washing textile fabrics.

2153. W. J. Cantelo. Improvements in the preservation of vegetable matters.

2155. W. Pratchitt and S. Horrocks. Improvements in apparatus to regulate the pressure of fluids, and to compensate for the expansion of steam and hot water pipes.

2157. R. McAdam. Improved apparatus to be employed in making cheese and in drawing off liquids.

2158. W. S. Wheatcroft and J. N. Smith. Improvements in valves and the chambers connected therewith, applicable to hydrants and taps for the supply of water and other fluids.

2159. J. A. Bosworth. Improvements in ma-

chinery for grinding and crushing clay and brick earth.

2167. C. Gumm. Improvements in the construction of boats. A communication.

2177. J. Buckley and T. Wrigley. Improvements in self-acting mules or machines for spinning and doubling.

2179. A. Smith. Improvements in machinery for, and in the method or methods of, making wire rop·s.

2180. J. Abraham. A new or improved gauge for gauging wire and sheet metal, and for other like purposes.

2194. T. Keddy. New or improved machinery for the cultivation of land.

2199. A. J. Dessales. An improvement in lamps for railway carriages, ships' cabins, and other oil lamps.

2204. F. Potts. Certain improvements in the mode of cutting out, forming, and finishing certain descriptions of metallic tubes, part of which is also applicable for other such like purposes.

2205. W. Hartley. Improvements in steam engines and steam boiler apparatus.

2225. J. Dufau. Improvements in regulating or controlling railway and lighthouse signalling.

2260. A. V. Newton. Improved machinery for kneading dough. A communication.

2269. A. V. Newton. Certain improvements in bakers' ovens. A communication.

2272. F. X. Gentil and E. Gentil. Improvements in preparing and treating asphodel in order to obtain alcohol.

2287. L. Gisborne and H. C. Forde. Improvements in apparatus for paying out electric telegraph cables.

2291. G. Bell. Improvements in reaping and mowing machines.

2295. R. Elliott. Improvements in photography by which the lensular defects of the present processes of taking photographic prints are avoided and impressions are obtained of any size.

2311. L. Moreau. Improvements in apparatus for carbonizing peat, wood, and other combustible matters.

2353. H. Lawford. An improvement in the manufacture of dining tables, expanding and contracting tops, applicable also to other expanding and contracting planes.

2481. J. Chubb. Improvements in the construction of iron safes and doors for strong rooms.

2485. R. Watson. Improvements in weaving.

2519. J. Ward. Improvements in pumps applicable for mines, ships, and other purposes.

2562. J. Stoneham and J. P. Lees. Improvements in uniting or connecting piping.

2662. W. Osborne. Improvements in ladies' petticoats, under skirts, and dresses.

2761. J. Lawson. Improvements in machinery for roving flax and other fibrous substances. Partly a communication.

2810. H. Beinhauer. Improved machinery for drawing or extracting water from mines, wells, pits, or other deep places by means of suction.

2831. A. R. M. de Normandy. Improvements in the manufacture of soap.

2867. A. V. Newton. Improvements in apparatus for retarding and stopping the progress of railway trains. A communication.

2880. D. Foxwell. The application of a certain material for the backs of cards.

2902. T. H. H. Kelk. Improved metallic alloys.

2915. C. L. West. Improvements in window sashes. A communication.

2939. W. Searby. An improved form of elastic spring applicable to bedsteads, sofas, chairs, the padding and seats of carriages, and other similar purposes. A communication.

2941. A. F. Butler. Improvements in machinery for pulping coffee.

2966. R. Tindall, jun. Improvements in harpoon guns and ammunition.

2994. J. Fowler, jun., and W. Worby. Improvements in apparatus used when ploughing, tilling, or cultivating land.

2999. G. T. Bousfield. Improvements in collapsible boats. A communication.

3014. A. Morton and J. Howden. Improvements in obtaining motive power.

3037. H. Dolman. An improved stand for cheval and other dressing glasses.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

2666. Louis Henry Frederic Melsens.
2668. John Henry Johnson.
2684. William Milner.
2688. Robert Walker.
2694. Henry Render.
2702. John Hunt.
2710. Felix Marie Baudouin.
2719. Warren de la Rue.
2763. Bernard Hughes.

LIST OF SEALED PATENTS.

Sealed December 18, 1857.

1701. George Pemberton Clark.
1709. Horace Hollister Day.
1713. Thomas Spencer.
1717. Horace Hollister Day.
1721. Edward Kirk, James Leadbetter, and Charles Wilson.
1724. Samuel Fox.
1726. Samuel Fox.
1728. Benjamin Richardson.
1735. William Edward Newton.
1741. John Norris, jun., and George Worstenholm.
1742. Sir Francis Charles Knowles.
1759. Richard Morcom.
1775. Edouard Besnier de la Pontonerie.
1781. Josiah Wright, Alfred Wright, and Francis Roberts.
1789. William Price Struvé.
1809. Arsène Auguste Olivier.
1810. George Swindells and Jonathan Arnold.
1811. John Carter and Brook Hodgson.
1815. Samuel Nye.
1845. Charles Orphin and Edward Lyons.
1853. Joseph Lockett and William Watson.
1855. Alexander Angus Croll.
1871. Thomas Bowden.
1918. Thomas Vicars, sen., Thomas Vicars, jun., Thomas Ashmore and James Smith.
2085. Antoine Galy-Cazalat and Adolphe Huillard.
2343. James M. Miller.
2433. Arthur Rigg, sen., and Arthur Rigg, jun.
2505. Samuel Clarke.
2587. Pennell Herbert Allman.
2695. Thomas Hamilton and James Hamilton.

Sealed December 22, 1857.

1746. William Knapton.
1748. William Symons.
1754. Joseph Scipion Rousselot.
1755. Richard Archibald Brooman.
1762. Charles Fréderic Vasserot.
1765. John Juckes.
1768. Charles Sanderson.
1776. Charles Grafton Page.
1777. John Talbot Pitman.
1779. William Green.
1782. Elijah James Crocker.
1783. John Ingham, Edward Ingham, and Benjamin Ingham.
1787. William Palmer.
1793. John Lloyd.
1796. William Parsons.
1797. Benjamin Nichols and Samuel Ledward.
1805. Charles Thurber.
1807. Richard Howland.
1812. William Edward Newton.